LOGIC AND ARGUMENT

By JAMES H. HYSLOP

Presented to
Bonebrake
Theological Seminary
Library
Dayton, Ohio

by

Dean C. E. Ashcraft

Charles E. Ashcraft
Mar. 31, 12.

LOGIC AND ARGUMENT

LOGIC AND ARGUMENT

BY

JAMES H. HYSLOP

LIBRARY OF
Bonebrake Theological Seminary
BC
101
.H8
1899
23,845

CHARLES SCRIBNER'S SONS
NEW YORK 1900

Copyright, 1899, by
CHARLES SCRIBNER'S SONS

TROW DIRECTORY
PRINTING AND BOOKBINDING COMPANY
NEW YORK

PREFACE

This work has been written to supply a double want, namely, the combination of a purely elementary logic with the art of argumentative discourse. Nor has this last feature of the subject been added out of deference to a revival of an intellectual interest in collegiate debate, but it has been suggested both by the practical value of logic as mental discipline and its close connection with the proper and orderly discussion of all subjects in which educated men are expected to engage. Logic as a practical art may be made quite free from discussion of the theory of knowledge; and thus free from philosophic problems, may be made most serviceable in the field of clear and systematic thinking wherever a man is called upon to form and express his opinions. The author has long felt that *formal* and applied logic of the elementary kind can be taught as well in the earlier as in the later part of a collegiate course, so that the student can receive the benefit of it throughout his whole academic career. It is especially a subject which ought to follow closely upon mathematics. The value of this latter science lies in the habit of reasoning which it fosters, but it labors under one grave fault, if it is not supple-

mented by a knowledge of practical logic on other data, and this is the encouragement which it may unconsciously offer to over-confidence in the legitimacy of our reasoning in subjects where our propositions do not resemble those in mathematics. Mathematics is the most important science in which to begin our discipline in reasoning, because we are not complicated with all those modifications of meaning which the subjects of distribution and equivocation introduce into the process in other sciences. But it ought to be followed closely by logic in a long and careful application to practical examples that may contribute to general knowledge while they also effect mental discipline.

For a somewhat similar reason I have connected it with one department of rhetoric, but only that which is concerned with the treatment of arguments. But I have not more than merely outlined this aspect of the subject, leaving to the instructor the development both of detailed rules and of practical work in themes. The outline and discussion of any thesis often depends upon a variety of circumstances for which only the most general rules can be given, and hence I have endeavored only to assist the teacher in saving time by giving the student the general principles in order to limit the amount of lecturing and dictation. The practical exercises will afford all the opportunity necessary for the special elucidation of principles.

The work has also been written so that the part devoted to rhetoric can easily be omitted and the

remainder used for purely elementary logic. The treatment of induction has been made very brief, as not being adapted to as easy mastery as deductive logic. But I have carefully outlined the subject of fallacies and methods of argumentation. It is hoped that the work may encourage an earlier study of logic than prevails in many institutions.

James H. Hyslop.

Columbia University,
May 22, 1899.

CONTENTS

CHAPTER I.

INTRODUCTION.

I. NATURE OF THE SUBJECT: Definition of Logic—Definition of Rhetoric. II. SCOPE OF LOGIC: Meaning of Law—Meaning of Thought — Prelogical Processes — The Logical Processes. III. SCOPE OF DISCOURSE: Divisions of Idea Expression—The Functions of Discourse—Explanation—Confirmation. IV. SUMMARY, ... *Pages* 1–17

CHAPTER II.

CLASSIFICATION OF TERMS OR CONCEPTS.

I. DEFINITION OF TERMS. II. DIVISION OF TERMS: Categorematic and Syncategorematic Terms — Singular and General Terms—Collective and Distributive Terms—Concrete and Abstract Terms—Positive and Negative Terms—Absolute and Relative Terms, ... *Pages* 18–30

CHAPTER III.

THE CONTENT OF TERMS.

I. INTRODUCTION. II. EXPLANATION OF THE PREDICABLES: Extension — Intension. III. ANALYSIS OF CONCEPTS: Definition—Division—Partition, . *Pages* 31–52

CHAPTER IV.

EXPLANATORY DISCOURSE.

I. Introduction. II. Analysis of Themes: Application and Use of Definition—The Application and Use of Division—The Application and Use of Partition — Methods of Applying Analysis. III. Synthesis or Composition: Laws of Composition or Synthesis — Forms of Composition. IV. Conclusion, ... *Pages* 53–71

CHAPTER V.

PROPOSITIONS.

I. Definition. II. Divisions: Univocal Propositions—Equivocal Propositions. III. Distribution of Terms, *Pages* 72–92

CHAPTER VI.

OPPOSITION.

I. Meaning of Opposition. II. Laws of Opposition. III. Special Cases. IV. Practical Application of Opposition, ... *Pages* 93–102

CHAPTER VII.

IMMEDIATE INFERENCE.

I. Definition. II. Divisions: Conversion—Obversion, Contraversion or Contraposition—Inversion—Contribution—Antithesis, ... *Pages* 103–117

CHAPTER VIII.

MEDIATE REASONING.

I. Definition. II. Divisions. III. Elements of the Syllogism. IV. Rules for the Syllogism: Rules Affecting the Subject-Matter of the Syllogism — Rules Affecting the Quantity and Quality of Propositions. V. Moods of the Syllogism. VI. Figures of the Syllogism. VII. Reduction of Moods and Figures. VIII. Practical Importance of the Figures, . . . *Pages* 118–130

CHAPTER IX.

SIMPLE AND COMPLEX FORMS OF CATEGORICAL REASONING.

I. Classification of Forms. II. Exposition: Prosyllogism and Episyllogism — Enthymeme — Epicheirema — Sorites, ... *Pages* 131–137

CHAPTER X.

HYPOTHETICAL REASONING.

I. Nature and Divisions. II. Simple Hypothetical Syllogisms. III. Dilemmatic Reasoning. IV. Reduction of Hypothetical to Categorical Reasoning, *Pages* 138–148

CHAPTER XI.

DISJUNCTIVE REASONING.

I. Nature of Disjunctive Reasoning. II. Forms of Disjunctive Reasoning. III. Reduction of Disjunctive Syllogisms, ... *Pages* 149–154

CHAPTER XII.

FALLACIES.

I. Definition and Divisions. II. Formal Fallacies: Illicit Process of the Middle Term—Illicit Process of the Major Term—Illicit Process of the Minor Term—Illicit Process with Negative Premises—Illicit Process with Mixed Premises and Conclusions. III. Material Fallacies: Fallacies of Equivocation—Fallacies of Presumption. IV. General Observations, ... *Pages* 155–184

CHAPTER XIII.

INDUCTIVE REASONING.

I. General Nature of Inductive Reasoning: Perfect Induction—Imperfect Induction—Definition of Inductive Reasoning. II. Formal Process in Induction. III. Inductive Fallacies, ... *Pages* 185–191

CHAPTER XIV.

PROOF AND ARGUMENTATION.

I. Introduction: Nature of Proof—Kinds of Proof. II. Process of Proof or Argument: Definition—Analysis—Probation. III. Classification and Arrangement of Arguments: Forms of Argument—Arrangement of Arguments, ... *Pages* 192–214

QUESTIONS AND EXAMPLES, . . *Page* 215

LOGIC AND ARGUMENT

LOGIC AND ARGUMENT

CHAPTER I

INTRODUCTION

I. **NATURE OF THE SUBJECT.**—Two sciences or arts, as the case may be, are represented in the title to this book. They are Logic and Rhetoric. But the whole province of both of them will not be comprised in this one treatise. Only those portions of their territory which are closely allied will be comprehended in the plan before us, which will be to combine the principles of correct reasoning with those of systematic and orderly discourse. The more scientific portion of Logic and the more literary aspect of Rhetoric will be omitted, while we unite the practical functions of the former with the systematic principles of the latter. Discourse will thus get its treatment from a point of view which involves both a method of logical reasoning and a systematic form of constructing the material of thought, while the scientific object of the one and the æsthetic object of the other give way to the one purpose of teaching the student to *logically sys-*

tematize the knowledge which he acquires. In order to show the relation of the two subjects to each other and the mode of their present combinations, a careful definition and explanation of their contents is necessary.

1st. **Definition of Logic.**—Logic may be treated either as a science or an art, or both. As a science it seeks to determine what are called the laws of thought, which is represented in the three processes of conception, judgment, and reasoning. As an art it applies these laws or rules to every-day thought. Thus a science teaches us to *know*, and art to *do*. But the distinction does not require to be urged for present purposes. The object here is to select just those parts of both aspects that are suitable to systematic and logical discourse, as distinct from mere description, on the one hand, and pure science on the other. Consequently we may speak and think of logic from its practical side, or so much of it as pertains to orderly methods of statement and argument. Logic for this purpose will consist of the rules that regulate correct thinking and systematic presentation of ideas, more especially in the form of argument. As a whole it has two objects to fulfil: (1) To determine the general laws of thought which are called the formal principles of thinking, and (2) To explain the conditions under which these laws are to be applied and to be modified by the irregularities of language and common speech. The first object considers logic as a *pure* science, the second as an *applied* science or art. Only the latter aspect will enter into the purpose of the present treatise.

2d. **Definition of Rhetoric.**—Rhetoric may also be considered as either or both a science and an art. Like logic, it has to do with the form of discourse or the presentation of ideas. But it includes some things not considered by logic and omits some things included in logic. In both cases, however, it has a different object. It is not directly concerned with the rules of reasoning, nor with the truth of propositions and discourse, but with their form of expression. It is, therefore, the science and art of the æsthetic and correct expression of ideas. Consequently it will include descriptive and narrative methods not found in logic while it insists upon beauty of form, and omits investigation of the laws of reasoning, while it insists upon orderly construction of ideas in accordance with the principles of logical discourse. There are also then two aspects to rhetoric: (1) Beauty of form and expression, and (2) Systematic and orderly expression with a view to efficiency in imparting ideas. The former is the literary and æsthetic aspect, and the latter the discursive and persuasive function of the subject. But it is only the latter aspect that will enter into the present book, and only so much of it as directly relates to logical method.

II. **SCOPE OF LOGIC.**—In common usage logic is understood to treat of reasoning alone and its laws. But it has a wider field. The laws of thought apply to much more than reasoning, but only because "thought" is more than inference. It treats of all the complex processes of knowledge as distinct from the simple and elementary func-

tions of the mind, and in addition lays special emphasis upon the rules which determine the distinction between true and false thinking rather than upon the causes of mental phenomena. It omits the consideration of all elementary data of knowledge, such as sensation, perception, association, memory, and the mental states connected with art and ethics, the emotions, desires, and volitions, and confines attention to the three functions which constitute "thought;" namely, (1) The laws of Conception; (2) The laws of Judgment, and (3) The laws of Inference. Each of these will come up for study in the proper place. At present we must ascertain more definitely what is meant by "laws of thought."

1st. **Meaning of Law.**—The term "law" has three meanings, one in politics and ethics, and two in science. They are (1) A command or prohibition, an injunction either by government or by conscience to do or not to do; (2) The uniformity of events, or the fixed regularity with which events occur under conditions determining them; and (3) A rule which serves as a criterion of what is true or false. This is sometimes called a principle, and is distinguished from a cause in the ordinary sense of that term. With the first of these senses logic has nothing to do. It concerns only the other two with special reference to the third inasmuch as it is mainly occupied with the means of distinguishing between truth and error, so far as conception, judgment, and reasoning are connected with them. In science "law" is either a name for mere uniformity of events beyond our

ability to modify them, or it is a name for a principle or rule of our own action in which we endeavor to shape our thinking, feeling, and willing to the conditions of things outside of us as well as in the mind. Logic thus tries to find the uniformities of mental operations and to put us in the way of conforming to them correctly, or applying them so that illusion and error in knowledge and belief may not occur. In the present treatise, however, we shall not occupy ourselves with the determination of these laws as mere uniformities of events, but as rules to be kept in mind when engaged in discourse or argument, and hence as helps to systematic and clear thinking. For this purpose we do not require to study the most general "laws" of thought, but only those minor and subordinate rules connected with the use of conceptions, judgments, and reasoning, and which may be understood without a profound acquaintance with our subject.

2d. **Meaning of Thought.**—This term has more than one meaning, only one of which is of interest in logical discourse. We may enumerate four of its meanings: (1) Consciousness, (2) Meditation, (3) Comparison, (4) Reasoning. The first means merely "to have in mind," and involves no special laws of importance in logic. The second denotes reflection, or holding the attention upon some object of consciousness. The third and fourth usually imply this reflection, but denote more at the same time. They do not, however, represent the most comprehensive idea of the term which combines them and which may be

called *synthesis*. Thought or synthesis, as a logical process, may be defined as the mental act which compares, combines, and unifies experience so as to produce clear knowledge. This idea includes more than mere inference, and so comprehends all the processes that are connected with the formation of *complex* as distinct from *simple* ideas. Consequently in logic it is a term that comprehends all the mental actions connected with conception, judgment, and reasoning. These are occupied with complex ideas. The earlier and prelogical processes are connected with simple ideas, as they are often called: the mental states which do not compare, discriminate, or unite experiences to form thought wholes. Both classes of mental action may come in for brief consideration.

1. **Prelogical Processes.**—These are: (1) Sensation, the definite states of consciousness effected by the mind's reaction upon stimulus from the external world; (2) Apprehension or Perception, the act of being aware of a fact that it is, not necessarily what it is; (3) Memory, involving the retention, reproduction, or association and the recognition of past experiences. These are all elementary acts of the mind, not involving comparison or unification of any kind. They represent simple states of consciousness and simple subject-matter. They are the material or the occasion for calling into action the higher exercise of the understanding, but they are not themselves logical processes in the technical sense of the term.

2. **The Logical Processes.**—These are one and all acts of the mind which conceive a *connection*

between facts, or involve synthesis. They represent the mind as holding two or more objects of consciousness before it and affirming or denying some sort of connection or relation between them. When I see or think of an object I conceive it perhaps as a group of attributes or as belonging to a class. In one case I perceive it, in the other I apperceive it; the former denoting the process of bringing the properties to inhere in the same subject and the other the process of seeing *what* a thing is. In both I compare and unify experiences or things. Also when I reason. In all I am discovering relations in a series or multiple of facts that make them some kind of definite whole. This may be made clearer by considering the three processes with which logic is concerned—Conception, Judgment, and Reasoning.

(*a*) *Conception.*—Conception is the act of mind which in some way unites facts or experiences to form definite ideas. The product may be called a concept. This is of two kinds: (1) Individual wholes and (2) class wholes. The former may also be called attribute or substance wholes, and the latter general concepts. But the individual whole is found by conceiving a group of attributes as belonging to the same thing or subject. It is illustrated most clearly by a proper noun, such as "Plato," "Bucephalus," etc. A general term will also represent such a group of attributes, usually if not always, but it also stands for more than this at the same time. A class whole represents a group of individuals, thought together and denoted by the same term on the ground of common

attributes. Thus "man," "quadruped," "tree," "animal," are concepts that denote an indefinite number of individuals of like kind and applicable equally to each individual in the class. They are names for objects grouped together distributively, as it is called, and not collectively, by an act of comparison and abstraction. The common properties are noted and the differences are ignored. But in both kinds of concepts an act of synthesis takes place. In *individual* or *attribute* wholes the synthesis is of different attributes or qualities in the same thing or subject, and in *class* wholes or general concepts the synthesis is of the same or like qualities in different things or individual subjects. The same distinction can be expressed in another way. The former may be considered a group of different attributes in the same subject or individual, and the latter a group of different individuals or subjects with similar attributes, only the common qualities being considered, while the differences are neglected. The acts of mind in each case are both unifying acts, involving a judgment of connection, though they differ in respect of the object-matter about which they are employed. Both seize upon the constant facts or groups of facts and qualities for the purpose of giving them a name which may always denote them and be their logical equivalent in discourse. All conceptions whatsoever may fall under one or the other of these forms. No exception is possible until a subject is found with only one property, and this could still be called an individual whole, though we should not speak of a synthesis

of different qualities, but merely the idea of a single quality in a subject.

(*b*) *Judgment.*—Judgment is the act of mind which perceives and asserts a relation between things. It may be a relation of identity or difference, of agreement or disagreement, an affirmative or a negative relation. The term is also used to denote a proposition which is in reality the product of the act. But here the emphasis is upon the mental act which connects affirmatively or negatively objects of consciousness. These objects will be attributes and subjects. The relations will be between attributes and attributes, subjects and attributes, and subjects and subjects. Thus I may affirm or deny a connection between various attributes, or between various subjects and attributes, or between various subjects. For instance, "White is not blue," "Plato is wise," "Men are bipeds," or "Lincoln was not Socrates." The act of judgment involves a connection or exclusion which cannot always be expressed by a single term or concept, and hence is often defined as the assertion of agreement or disagreement between concepts. For practical purposes this definition can be accepted, though the more technical account of it may be considered in order to evade objections based upon the desire for theoretical completeness and accuracy. The fact that most judgments in discourse are judgments of relation between individual and general concepts, as defined technically, may justify the reference to them in that form as typical of practical usage, and we may either stretch the term "concept" to include in-

dividual attributes as such, or permit the action of judgment to relate or connect properties that are sometimes called percepts or individual objects of apprehension in distinction from individual and class wholes. But aside from the question of its subject-matter the judgment is still a unifying act or assertion of relation of some kind. It represents consciousness as looking at two facts or things at the same time, and pronouncing upon this agreement or disagreement, likeness or unlikeness, connection or disconnection with each other.

(*c*) *Reasoning*.—This process is simply a little more complex in its object-matter than conception and judgment. It is still an act of discovering or asserting relations, but most usually between judgments, though it may be involved in the formation of concepts themselves. In usual discourse, however, it is the movement of the mind from one proposition to another in which the act discovers and asserts, and agreement or disagreement between relations noticed in judgments. Thus if I know that metals have a metallic lustre and am told that sodium is a metal, I am likely to infer that sodium has a metallic lustre, though I have not seen the fact. I expect to find this fact to be true on the fact that the asserted connection between sodium and metals, on the one hand, and metals and lustre on the other, is true. The inference or reasoning is the transition to connections that are not suggested by a single proposition in this case, though in one kind of reasoning a new order of connection may come out of even a

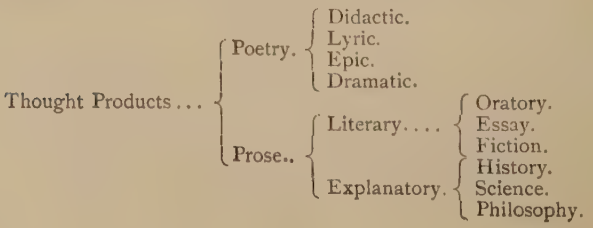
single statement. But in all cases the same act of noting identity and difference, agreement and disagreement as in judgment, characterizes reasoning, only the matter is more complex than in the other two logical processes. It is a process which usually or always affects the degree of certitude or probability in regard to propositions which may not carry with them satisfactory conviction until this relation is seen. Consequently it becomes a means of proof and discovery, if not of new matter of knowledge, then of new relations between known facts.

Logic will then have to do with the laws that regulate the formation and correct use of conceptions, propositions, and reasonings, the processes involved in the comparison and unification of ideas. Its main object is to establish conviction when it is employed as an art, and to formulate laws for correct thinking when it is a science. Its scope, however, covers all the acts of mind comparing and connecting phenomena for the sake of knowing their relations as subject to constancy and proof.

III. **SCOPE OF DISCOURSE.**—The general meaning of thought expression, as comprehending every kind of presentation of ideas, has already been mentioned, and also the aspect of it which will come under notice here. We found it to represent both æsthetic and systematic form, and stated that only the latter feature would be included in the present treatise, as the field for the application of logical as distinct from literary or rhetorical method proper. That is to say, we

intend here to examine the principles which regulate the systematic construction of discourse as distinct from elegance of expression or of forms designed merely to please the feelings of taste. But it will conduce to a better understanding of our purpose if we briefly sketch the whole field of idea expression comprising the literary, historical, scientific, and philosophic modes of thought. We can then clearly observe the limited conception to be taken of discourse for our purposes.

1st. **Divisions of Idea Expression.**—The expression of ideas divides itself into two general forms, namely: Poetry and Prose. This distinction is based merely upon the mode of literary and grammatical construction. Both are governed by the two functions of rhetoric, æsthetic principles designed to please the feelings, and systematic principles to influence the intellect. Each division, however, can be further sub-divided: Poetry into Didactic, Lyric, Epic, and Dramatic, and Prose into the Literary or Polite, and the Explanatory. The Literary or Polite Prose may be divided into Oratory, Essay, and Fiction, and the Explanatory into History, Science, and Philosophy. The tabular outline below gives a bird's-eye view of this field.



Now the conception of Discourse as it is here to be cultivated will cover the whole field of Prose where the rules for systematic construction of thought are the same for the literary as for the explanatory forms of expression; but special reference will be made to the explanatory branches of idea expression. Perhaps even the same principles are applicable to Poetry, as I think they are, but as we are not considering either the special principles that distinguish poetry as such, nor the æsthetic object of all expression we may limit the idea of Discourse or systematic construction to Prose, and thus keep in view the logical side of the subject. Hence we shall speak of Discourse as the *systematic* expression of thought, and illustrate it exclusively for the field of prose, ignoring that aspect of rhetoric which has æsthetic expression for its object.

2d. **The Functions of Discourse.**—Discourse, like logic, has an object. This object is to discuss and present a *theme.* The theme is some subject of thought, and may be either an idea or a truth, a single object of thought requiring analysis and exposition, or a proposition requiring demonstration. The object to be served by discourse will thus have a range limited by the nature of the theme. The range will be less in the case of an idea than in that of a truth, while the latter will include one additional function and all that is required by the former. An idea or single conception requiring explanation and analysis will be any individual or class whole, such as "metals," "cathedral," "architecture," "art," "science,"

"Greece," "Plato," "British Museum," "The Papacy." All of these are objects to be described and explained, and not to be proved. But the second class of conceptions either imply judgments or state them, and in addition to explanation require proof. They are concerned with the establishment of the *truth*, or reality of an idea or proposition. The former concerns only what it is, or its nature as an admitted or conceivable fact; the latter concerns the truth of some law, fact, or principle embodied in judgments. The proposition may not always be expressed formally. It may only be implied, even in a single term, as in titles, headlines, etc. But a theme is subject only to explanation when it is merely a conception, individual or general, and becomes subject to proof in addition to explanation only when it expresses or implies a proposition to be affirmed or denied. Such are "protection," "free trade," "Malthus law of population," "patent laws," "single tax," "punishment," "private property," "the importance of the family," "the necessity of quarantine," "the existence of God," "immortality," "the freedom of the will," etc. In propositions these conceptions take the form, "protection is indefensible," or "protection is necessary," "God exists," "the will is free," etc. In them we have judgments whose terms are to be explained, and whose assertions are to be proved or disproved, while in individual conceptions the process stops with exposition. The whole process of discourse, however, of logical discourse, as here defined, consists of two fundamental forms

of method with their subordinate divisions. They are *Explanation* and *Confirmation*. Each of these can only be briefly outlined at this stage of the work.

1st. **Explanation.**—The explanation of a theme is the exposition of the characteristics or facts which constitute the object of thought. It states what a thing is and shows all the qualities or events which it represents, and involves two general processes. They are *Analysis* and *Synthesis*. Each is the complement of the other, and both processes are necessary to complete the process of explanation.

(*a*) *Analysis.*—The analysis of a theme is the separation of a conception or whole of thought into its constituent parts, qualities or relations, in order to find all that it means or implies. It is a process that discriminates between the essential and non-essential attributes expressed by a thing. Its object is to render clear the parts that make up a whole. Three processes are involved in it. They are *Definition*, *Division*, and *Partition*. The discussion of them will come up in the proper place.

(*b*) *Synthesis.*—Synthesis is a constructive process, and consists in the systematic arrangement of the parts of a whole in order to give a clear and complete conception of it as a whole. As analysis shows only the parts that constitute a thing, synthesis shows the manner in which those parts constitute an orderly whole. Synthesis exhibits a coherent totality, a finished product, and analysis the raw material out of which it is com-

posed. There are two forms of synthesis, according as the theme or object of thought represents a *space* whole, or a *time* whole. They are *Description* and *Narration*. Both are processes of systematization, and aim to give an orderly account of the qualities or facts expressed or implied by a theme. They will be further discussed at another time. Possibly *Exposition* might be added as a third form of synthesis, for what may be called thought wholes.

2d. **Confirmation.** — Confirmation is proof, a process of establishing conviction. The previous processes only show what a conception means, or what a thing is : they do not determine conviction. They impart instruction as to facts and form ideas of real or possible things, but they do not aim to dissolve doubts, to decide beliefs, to fix the truth or falsity of propositions. Proof is the process by which the truth of a judgment is established. There are two forms of this proof or confirmation, according as it determines certitude or probability. They are *Deductive*, or *Analytic*, and *Inductive*, or *Synthetic* Proofs. They represent the reasoning processes of discourse, and are superadded to those of explanation. They also will come up for more careful exposition.

IV. **SUMMARY.**—We have now found that logical discourse comprises a knowledge of the laws of thought and of the laws of constructive arrangement. We thus combine in this treatise the practical part of logic and the logical part of rhetoric. The laws of thought will be considered only in so far as they are necessary for regulating

the correct interpretation and use of conceptions, judgments, and reasoning, and the principles of rhetoric will be considered only in so far as they deal with clear and systematic treatment of themes, the art of æsthetic expression being left to others for discussion. Discourse then, as it is here conceived, denotes the logical analysis and synthesis of the ideas expressed by a theme, and all subsequent investigations will concern the laws and conditions under which those processes can best be applied.

CHAPTER II

CLASSIFICATION OF TERMS OR CONCEPTS

I. DEFINITION OF TERMS. — The words "Term" and "Concept" are identical in logic, but in general usage their synonymous meaning is not so apparent. "Term" has a grammatical association and generally denotes a *word*, while concept denotes always an *idea* of some kind. In logic, however, a term is any word or words that constitute a subject of thought. Concept denotes the subject of thought without suggesting so distinctly the word by which it is named. But it is the idea or subject of thought that is the important fact, and this may be expressed either by a single word, or by any combination of them that denotes a single idea. For instance, "the Queen of England," "the elderly gentleman in the box," are as much terms in logic as the single words "man," "tree," "house," etc. Consequently a "Term" in logic may even be a whole clause or phrase, provided that this is a mere adjunct of a central concept which it designs to make more definite.

II. DIVISION OF TERMS. — The classification of terms is various, inasmuch as there are many points of view from which to consider them.

But each division may cover all the terms used in discourse or having importance.

1st. **Categorematic and Syncategorematic Terms.**—This division is based upon the distinction between what is essential and what is not essential to the formation of a proposition.

1. Categorematic terms are those which can stand as the subject or predicate of a proposition. They are of three kinds: (a) *substantive*, as "horse," "animal," "government;" (b) *adjectival*, as "true," "generous," "pertinent," and (c) *verbal*, as "shine," "rule," "assert."

2. Syncategorematic terms are such as cannot stand alone as subject or predicate of a proposition. They are of two kinds: (a) *modal*, as "verily," "amiably," "considerately," or all adverbs, and (b) *relational*, as "in," "by," "to," "and," "through," or prepositions and conjunctions.

2d. **Singular and General Terms.**—This division is based upon the distinction between Individual and Class Wholes, or the number of objects to be denoted by a term. Accordingly, terms in this classification are distinguished by their form of *extension*, a property to be considered farther on.

1. *Singular Terms* are those which apply in the same sense only to a single object, real or imaginary. Proper names are good illustrations, as "Europe," "Plato," "Paris," though any term not a proper name but denoting only a single whole, will also be singular, as "the first man," "the highest good," and possibly "time," "space," etc. A combination of terms, such as "The present Secretary of State," "The King of Spain," "The

Superintendent of Public Buildings," etc., will also be singular, when it refers only to one specific person or thing. Even expressions, like "*this* table," referring to an individual case in view, or "the street running diagonally across the city of A," etc., are singular terms. Some seem to have thought that terms like "water," "stone," "ice," "mercury," "iron," may sometimes be singular, as being similar to "space," "time," "universe," but I should treat them as *abstract* whenever used to denote the quality or qualities which make the kind of thing denoted by them. *Oneness of kind* is not the only or distinctive feature of singular terms, but *individuality*, or singularity, as representing a concrete individual whole.

2. *General Terms* are those which can apply, in the same sense, to each individual in an indefinite number of objects, real or imaginary, and of the same kind. They are, therefore, terms representing *class* wholes, as singular terms represent *individual* wholes. Illustrations of general terms are such as "man," "vertebrate," "animal," "trees," "figures," "bipeds," etc. In these instances the terms denote more than one object and apply to all of the same kind. Their meaning is important in the interpretation of what are called universal propositions.

3d. **Collective and Distributive Terms.**—This division is based upon the distinction between aggregate wholes of the same kind and class terms. It partly coincides with the division into singular and general terms, the latter always being distributive.

1. *Collective Terms* are those which apply to an aggregate whole of individuals, usually similar in kind and constituting together a totality that is spoken of as if it were an individual. Thus, "army," "forest," "crowd," "nation," "family," "regiment," are collective terms because they denote composite or aggregate wholes.

2. *Distributive Terms* are those which apply to each individual in a class, or to a single individual. For example, "man," "vertebrate," "quadruped," "book," "Germans," are distributive terms. It will be remarked also that they are general terms. But even singular terms are distributive, as "Bismarck," "Pitt," etc. Consequently, "distributive" expresses individual denotive power as distinct from composite, while singular and general distinguish between one and more than one object of thought, whether collective or distributive. Hence we find the division between singular and general terms crossing between that of collective and distributive. Thus some singular names or terms are collective, as "The Vatican Library," "The 72d Regiment," "The French nation," while also all collective terms not singular and applicable to an indefinite number of similar aggregates are general and therefore are distributive at the same time that they are collective. But they are not distributive in the same sense that they are collective.

It is important also to keep clear the distinction between *class* wholes and *collective* wholes, or the distinction between distributive and the collective functions of the same or different terms. They

are often confused so as to call a term denoting a class a collective term. But the radical difference is that, besides denoting more than one, collective terms name a whole spoken of as one object, while class or general terms denote both more than one and apply to each individual in the class. Collective terms do not apply to the units composing the aggregate. The relation between the two divisions may be summarized in the following tabular form:

Terms	Singular	Distributive	or Terms	Distributive	Singular.
		Collective			General.
	General	Distributive only		Collective	Singular.
		Collective and Distributive			General.

4th. **Concrete and Abstract Terms.**—It is much more difficult to define concrete and abstract terms satisfactorily, because the current and traditional accounts of them show less agreement than in the previous cases. But the general distinction is based upon the difference between anything considered alone, and out of relation to its individual subject. There are also terms that have both a concrete and an abstract signification.

1. *Concrete Terms* are those which stand for a thing thought and used as a subject of properties, or for an attribute thought and used as an attribute, but in each case conceived independently and alone. This definition provides for two kinds, certain nouns and all adjectives. Thus "Parthenon," "Lincoln," "Charter Oak," and "wise," "noble," "clear," etc., are concrete terms or conceptions.

2. *Abstract Terms* are those which represent an attribute conceived apart from the subject to which it belongs, and treated as if it were a subject itself. Thus, "righteousness," "ability," "virtue," "purity," "redness," are abstract concepts or terms. These are used as nouns and can become subjects of propositions, while the attributes they express can only be predicates.

3. *Subdivisions.*—Some terms are only concrete, some are only abstract, and some may be either concrete or abstract. This fact gives rise to the distinction between *pure* and *mixed* terms. Then, as concrete terms may be either substantives or adjectives, we may recognize two kinds of this class and two kinds of the abstract. The following table or outline with illustrations will indicate what is meant while it explains the definitions:

- **Terms**
  - Pure.
    - Concrete..
      - Substantive=Singular Nouns, *e.g.*, Homer.
      - Attributive=Adjectives, *e.g.*, Pure.
    - Abstract..
      - Static=Adjectival Nouns, *e.g.*, Sweetness.
      - Dynamic=Verbal Nouns, *e.g.*, Distillation.
  - Mixed=Concrete *and* Abstract, *e.g.*, Government, Religion, etc.

Certain kinds of terms are omitted from the illustrations in this outline. They are such general terms as "man," "tree," "animal," "building," etc. The reason for this omission is that some writers treat them as concrete. But this is due to a conception of the concrete which is not the logical one and which will come up for consideration in a moment. I regard them, however, as both concrete and abstract, and hence as belonging to the mixed class along with "government," "religion," etc., and for the same reason. All

general terms, in fact, may be treated as abstracts, though it may not be true that all abstract terms are general. But general terms are abstract when they stand only for the common properties of the individuals composing the class, and concrete when they denote the individuals as such. Thus, in the use of a distinction still to be explained, general terms are abstract when they are taken in their *intension* or to denote the *qualities* expressed by them, and concrete when they are taken in their *extension* or to denote the *number* of individuals in the class.

4. *The Popular Distinction.*—The popular conception of concrete terms is that of *sensible* objects, and of abstract terms as that of *non-sensible* things. This notion coincides with the difference between material and immaterial things. From this point of view "man," "tree," "Plato," "Bismarck," "nation," "white," "round," "heavy," would all be concrete, and "thought," "emotion," "spirit," "government," "religion," "generous," "sincere," etc., would be abstract. But while this distinction may do very well for the purpose of indicating the difficulties involved in imparting our ideas of non-sensible things, it does not serve the purposes of clear logical thinking. The common mind may find it easier to deal with tangible or sensible things, but the propositions and beliefs we form have as much to do with the non-sensible as the sensible, and hence the distinction for logic between the concrete and the abstract must be between facts conceived as self-sufficient and facts conceived out of relation to their subject, and not

between the representable or picturable and the non-representable or unpicturable. Errors in argument do not occur from the confusion of the intangible with the tangible, but from the illegitimate transition from a fact out of relation to its subject, or *vice versa*, and hence it is this distinction which logic must keep in view.

5th. **Positive and Negative Terms.**—This division is based upon the distinction between terms that imply the presence and those that imply the absence of an attribute. From the position of grammatical form in connection with meaning we may recognize also Privative and Nego-positive terms or concepts, as will be further explained, but considering "terms" and "concepts" as identical we may reduce the four forms to two, and divide each of the two into pure and mixed. This may be represented after the definition of each.

1. *Positive Terms* are those which signify the presence or possession of certain qualities denoted by the word; for example, "good," "pure," "excellence," "metal," "organic," "human," etc., are positive terms. They are positive grammatically and logically, or both in form and matter.

2. *Negative Terms* are those which denote the absence of certain given qualities; as "inorganic," "insincere," "imperfect," "headless," "unnatural," etc. These are negative in both form and matter. The usual symbols of negative terms are *in*, *un*, *less*, *dis*, *a* or *an*, *anti*, *mis*, sometimes *de*, and *non*, and *not*.

3. *Privative Terms* are those which signify the

absence of a quality or qualities once possessed or belonging normally to the object named. Thus "deaf," "dead," "dumb," "blind," "dark," etc., are privative terms. They are positive in form and negative in matter or meaning.

4. *Nego-positive Terms* are those which denote the presence of a positive quality though expressed in a negative manner; as "inhuman," "disagreeable," "infamous," "inconvenience," "displeasure," "invaluable," etc. They are negative in form and positive in matter. They can, in most cases at least, be distinguished from negative conceptions or terms, pure and simple, by substituting their positive equivalents. Thus "unhappiness" and "invaluable" have their equivalents in the positive terms "misery" and "costly." Some terms may be interpreted in either a negative or a nego-positive sense, according as we choose to use them. Thus "uncertain," "unhealthy," "unpleasant," "indistinct," may be conceived as the negatives of "certain," "healthy," "pleasant," "distinct," or, as the nego-positive equivalents of "doubtful," "sickly," "painful," "obscure."

5. *Summarized Divisions.* — The last remark shows that there may be a grammatical difference in the form of terms, but no logical difference in meaning or matter. It will be possible, therefore, to reduce the fourfold division of terms as here defined and based partly upon grammatical and partly upon logical principles, to two classes, based only upon logical principles. They will be viewed wholly from the standpoint of *concepts*,

which are logical in their implication, and not from that of *terms*, which have a grammatical association. Hence we may ultimately reduce all concepts, or terms *in meaning*, to two classes, the positive and negative, making the privative negative and the nego-positive, positive, though for the sake of clearness calling attention to their *mixed* character from the standpoint of grammatical structure as compared with their meaning. This is only to say that the grammatical and the logical criteria of the nature of terms are not always coterminous. Each taken alone will give us two divisions, positive and negative, but when terms come to be arranged under these divisions some that would be positive grammatically would be negative logically, and some that would be negative grammatically would be positive logically. We may, therefore, outline in tabular form the various ways of classifying and defining terms or concepts as just discussed.

Terms or Concepts
- Positive = Positive in both form and matter.
- Negative = Negative in both form and matter.
- Privative = Positive in form but negative in matter.
- Nego-positive = Negative in form but positive in matter.

Terms or Concepts
- Pure
  - Positive = Grammatical and Logical forms coterminous.
  - Negative = Grammatical and Logical forms coterminous.
- Mixed
  - Privative = Grammatically positive and Logically negative.
  - Nego-positive = Grammatically negative and Logically positive.

Concepts
- Positive ..
  - Simple = Pure positive.
  - Complex = Nego-positive.
- Negative..
  - Simple = Pure negative.
  - Complex = Privative.

6. *Infinitated Terms.*—There is a form of conception which is called "infinitated." This term is applied to such conceptions because it refers to that use of them which denotes the thought of all other things than those expressed by the corresponding positive term. It avails to divide all possible objects of thought into two classes. These classes may be called the positive and the negative, as above. The negative may be called the infinitated concepts. The usual symbol of such terms is *non* and *not*, as "non-moral," "non-material," "not-animal," "not-tree," etc. They are not always, if ever, recognized as rhetorically elegant, but are valuable often to make clear the really negative, or infinitatively negative nature of the idea in mind. Thus "tree" and "not-tree" will together comprise all objects of thought and in some logical processes, as dichotomous division, obversion and contraversion, to be considered later, it is important to have this fact known. Every term then, conceived or expressed by the qualification *non* or *not*, and denoting the whole universe of objects excluded from the positive concept is an *infinitated* conception. Even such terms as "not-just," "not-good," "non-moral," or perhaps all negative terms, can be conceived in an infinitated sense, and sometimes are so. But in common usage negative adjectival or attributive concepts are applied to the same general kind of subject as the positive, and no reference is made or understood to objects outside this particular limit. Thus, "not-just" would be confined to the universe of actions, this being divided

into "just" and "not-just *actions*," other things than actions not being implied or included in "not-just," and the infinitation not extending beyond the negative facts within the concept "action." The source of equivocation from this may be discussed again. But the wider meaning of infinitation is clearer when applied to substantive terms.

6th. **Absolute and Relative Terms.**—This division is based upon the distinction between independence and dependence on other terms for meaning. In its narrower import the distinction is not very important for practical logic, though the wider use of it, largely, if not wholly coinciding with that between Concrete and Abstract concepts, has very great value. Assuming the latter as sufficiently considered, we may be content with a very brief account of the former.

1. *Absolute Terms* are those in which the properties or qualities expressed are intrinsic to the individual subject and do not represent a mere relation to any other subject or being. Thus "man," "tree," "earth," "star," "book," may be considered as absolute terms. They do not imply any necessary correlatives to complete their meaning. The things which they denote may exist in all sorts of relations, but it may not be necessary to think of these relations in order to obtain an adequate idea of what the term means. Quite the contrary terms is true of relative.

2. *Relative Terms* are those whose distinctive meaning is derived from the relation expressed to some other individual object. Thus "father," "son," "parent," "master," "servant," "mon-

arch," "subject," etc., are relative terms. Each term suggests a relation to others as the distinctive meaning of the word. Thus "father" is a "man," but a man in a certain relation, and the term is intended to express that relation, which may not be a quality necessary for recognition of the individual as such. We see in this way that relative terms suggest the thought of other individuals with the relation involved as a part of the term's meaning, while absolute terms suggest only the qualities in the subject without a relation to others being necessarily involved.

CHAPTER III

THE CONTENT OF TERMS

1. **INTRODUCTION.**—Every term or concept has a content. This content is its meaning. As a term it is simply a word, a sound, a vocable, but it stands for something. It is a name for a thing, a fact, a quality or any circumstance about which consciousness or knowledge can be occupied. As a concept it is an idea which contains a reference to the same that is denoted by a word. The meaning or content is simply the character or characters which a term names or implies, or which an idea represents.

But the meaning, material content and ways of viewing a term are rich and various. All of them have a *quantity* and a *quality* import; that is, a reference to number and a reference to properties. These characteristics bear an important relation to the laws of thought and the art of discourse. Different principles have to be considered in treating of these two aspects in which terms may be taken, especially when we come to treat of propositions. But at present we are limited to their importance in terms.

The aspects under which concepts have always

been considered by students of logic have been expressed by the term *predicables*, borrowed from Aristotle, and expressing the nature of the "predicates" or attributes possessed by terms. They are the most general conceptions under which the meaning of terms can be described and have been given as five in number. I hope to show that they are reducible to four, with a subdivision of two of them which has an interest outside of the mere quantity and quality import of terms. But I shall first give the old table of predicables, following it with a new one.

	Old Table.		New Table.	
Genus	(γένος)	= Genus.	Genus	= Genus.
Species	(εἶδος)	= Species.	Species	= Species.
Differentia	(διαφορά)	= Difference.	Conferentia	= Identity.
Proprium	(ἰδιόν)	= Property.	Differentia	= Difference.
Accidens	(συμβεβηκός)	= Accident.		

To the new table I might add Essentia and Accidentia, or Essence and Accident, but I regard them as subdivisions of Conferentia and Differentia. The new table, however, enables us to classify the "predicables," or ways of looking at terms, according to their quantitative and their qualitative meaning. The Genus and the Species are names for that view of concepts which regards them in their quantitative power or meaning, and Conferentia and Differentia, in their qualitative power or meaning. This will be made clearer in the discussion. The following outline will show their relations to each other and to Essentia and Accidentia.

Content of Terms.
- Quantitative (Extension).
  - Genus.
  - Species.
- Qualitative (Intension).
  - Conferentia.
    - Essentia.
    - Accidentia.
  - Differentia.
    - Essentia.
    - Accidentia.

II. EXPLANATION OF THE PREDICABLES.—Before we enter upon the discussion of the analysis of terms or concepts, which is a process of determining the nature and range of their meaning, it will be necessary to define and explain the meaning of the predicables, and to show the relation which they bear to each other. They all refer to the content of conceptions, and, as indicated, are reducible to two general ways of conceiving the meaning of terms; namely, their number significance, which is called their *extension*, and their attribute significance which is called their *intension*. Each of these properties of terms must be taken up in its order.

1st. **Extension.**—The extension of a term is that property by which it denotes the number of objects expressed by it. This extension does not imply any definite number of objects, but names only the quantitative capacity of a term. The property is best illustrated by class wholes or general terms, as "man," "Caucasian," "animal," though singular terms have it, but in a less degree. Terms which compare a wider and narrower meaning indicate most clearly what is meant by the property, as "man" and "biped." "Man" denotes relatively fewer individuals than "biped" and there-

fore has less extension, or denotes a less number. This gives rise to two forms of expressing the relative differences in extension or quantitative import of terms. They are *Genus* and *Species*.

1. *Genus*.—Genus is a term which expresses the power of a class or general concept to include in it a narrower class of individuals or a number of individuals not grouped in classes. More briefly, genus describes every term which denotes a class whole of any kind. Thus "man" is a genus concept, because it is a name which applies to the various classes or individuals of the race included under it. "Substance" is a genus, because it includes under it iron, clay, brass, gold, silver, water, etc.

2. *Species*.—Species is a term which denotes either a narrower class or an individual comprehended in a genus or wider class. It has less quantitative meaning than genus. Thus "Caucasian" is a species of "man," "iron," of "metal," a "triangle," of "figure," etc. According to the definition also "Plato," "Burke," and all similar singular terms will be a species of "man." It will be apparent that the term has a somewhat different meaning from that which we often find in Natural History. It is the same with the term genus. But the doctrine of evolution shows a tendency to break down the fixed and definite conception of them current in science previous to it, and hence they have become both of them more elastic. This tendency therefore approaches more and more the logical and relative conception of the two terms. This requires a brief consideration.

3. *Relation of Genus and Species.*—The illustrations suggest the fact that genus and species are purely relative terms. Thus we find that "metal" is a genus compared with "iron," "gold," "silver," etc., which are its species, but is a species when compared with "matter," or "substance," which are its genera. To make this more general, we notice that a term is always a genus in relation to a narrower extension, and a species in relation to a wider extension. We may thus proceed in either direction until we reach the limits of farther progress, as "existence," "substance," "being," "vertebrate," "man," "American," "Lincoln." Here in this example, all intermediate terms between the two extremes are either genera or species, according as they are conceived in relation to a higher or a lower order; according as they include a lower, or are included in a higher class. Thus "American" is a genus to "Lincoln," and a species to "man," etc. But the two extremes cannot be viewed in this twofold relation. "Existence" is a genus, but not a species, and "Lincoln" is a species and not a genus. The former is not a species, because it cannot be brought under a wider class of objects, and the latter is not a genus because it cannot be divided into lower species or individuals. All singular terms are species and not genera, and are called the *infima species*, or lowest species. They are always individuals.

On the other hand the highest genus, because not a species, is called the *summum genus* or *genus generalissimum.* It is represented by some such

term as "existence," "thing," "something," "ultimate reality," "the absolute," or even "being" in its widest sense, but in all cases must be thought as a single concept. It is thus worthy of remark that there is in reality but one *summum genus*, while there may be an indefinite number of *infimæ species*. All intermediate terms between these extremes are sometimes called *subalterns*, as being either genera or species, according to the relation in which they are viewed.

An important fact also to remark is that genus and species represent concepts in a certain relation of agreement with each other. The genus always includes the species, and each species includes a part of the genus, while the species mutually exclude each other; that is, the terms denoting them are always opposed to each other.

It will be necessary to notice again and a little more fully the use of the terms genus and species in Natural History. A species is there "a class of plants or animals supposed to have descended from common parents, and to be the narrowest class possessing a fixed form; a genus is the next higher class." This is Jevons's definition, but he does not illustrate it. Perhaps we could say that, in Natural History, the term "tree" would represent a *genus*, and "oak," "elm," "maple," etc., would represent a *species*, while "red-oak," "white-oak," "black-oak," etc., would be varieties. But the peculiar use of the term species here is that it is supposed to be fixed, and not relative as in logic, where, as we have seen, any but the *summum genus* and the *infima species* may be either a genus

or a species, according to its relation to a higher or lower order. In natural history, however, species is supposed to represent certain fixed characters and relations to a common progenitor. But the acceptance of the doctrine of evolution prevents the drawing of any such determinate line of distinction, except arbitrarily. In this doctrine, founded upon the variability of "species," the conception becomes elastic and indistinct, denoting only certain characteristics different from the genus. Hence the change approximates the logical import, and may ultimately make them identical.

2d. **Intension.**—The intension of a term is its power to denote qualities. Every term not only implies a certain number of things, whether singular or general, but it also stands for certain qualities or properties which belong to the thing named. For instance, the term "man" is not only a name for a certain indefinite number of individuals to which the word applies, but it is also a name for the group of qualities or attributes which constitute these individuals. It denotes a certain form, stature, habits, intelligence, moral character, etc. These qualities make the individual man. The intension of the term is only a name for the qualities for which the term stands. They are also called the properties, attributes, characteristics of that to which they belong. Every term names or implies at least a certain number of them, as "mountain," "horse," "virtue," "religion," "car," "metal," "whiteness," "Bucephalus." Hence this power to denote qual-

ities in a term is called its qualitative power or intension, which in common English is its function to indicate or imply the properties possessed by the thing named. In the arrangement of things and events according to genera and species it is found to be necessary to distinguish these properties into two kinds, which I shall call the *Conferentia* and the *Differentia*. This shows a distinction between the kinds of intension or properties expressed by concepts. Each must be defined and examined in its order.

1. *Conferentia.*—Conferentia is the name for the common qualities expressed by a general or class term. Thus the concept "tree," considered in respect of its intension alone, or the properties denoted by it, represents those common, sometimes called universal, qualities found in all the individuals of the class: for instance, its woody structure, truncated form, possession of leaves and branches, capacity for growth, etc. Another illustration, as "Americans," shows vertebrate structure, complexion, stature, citizenship or birthplace, etc., are the common facts expressed by the term. Conferentia thus names the qualities that make the class, and is only a technical term for what are called the common or universal properties of the group of individuals expressed by general terms. Essence or essential properties are expressions sometimes used for the same fact. But as I propose to distinguish between what is universal or conferential as a fact from what may sometimes be called essential, I shall not make the terms exactly equivalent.

The term "conferentia" is synonymous with one meaning of the term "genus"; namely, that in which it is contrasted with differentia. There are two pairs of contrasts in which the term "genus" appears. One is "genus and species," in which the former *includes* the latter, and the other is the "genus and differentia," in which the former *excludes* the latter. In the comparison of genus with species, genus denotes the class with a larger number of individuals than the species, and represents the extension of a concept. In the comparison of genus and differentia, genus denotes the common qualities of the class which are distinct from the differences between the individuals in it. This equivocal use of the term can be prevented by limiting the word genus to the extension of the class, and conferentia to the intension or common qualities.

2. *Differentia.*—Differentia, or difference, is the name for the property or properties which distinguish one species from another, or, if we like, the species from the genus. Thus *two-footedness* or *bipedality* is the quality which distinguishes man from the quadrupeds. Or better, the form of the leaves is a differentia of the oak compared with the ash tree; the black skin the difference between the negro and the Caucasian; mathematical formula and purposes, the differentia of algebra compared with poetry, etc. Whatever distinguishes one object from another can be called the differentia. It is some characteristic in addition to the common qualities and determines the species or individual under the genus.

3. *Relation between Conferentia and Differentia.*— The first thing to be remarked about the properties expressed by these terms is that the distinction between them cannot be drawn in Singular terms. They apply only to General terms which comprise either more than one species or more than one individual. In an individual or singular concept the properties are all on the same level. Only in general terms compared with the species under them can we observe the distinction between conferentia and differentia.

The second fact to be observed is that conferentia and differentia always exclude each other. The conferentia is never a differentia, and the differentia is never a conferentia in the same relation. Thus feathers are a differentia between birds and horses, and never a conferentia of these two species. Otherwise they would have the same name to denote them.

But the third fact is that, although they never represent the same property in the genus *and* species, they may still refer to the same property in a class, provided that we consider the different relation in which it may be viewed. Thus the property which expresses the difference between one species and another may itself be common to all the members of the species in which it is found. Thus "two-footedness" may be the differentia of man as a species compared with the horse, but the conferentia of men as a genus compared with "Caucasian:" black skin is the difference between the "negro and the Caucasian," but the conferentia of the negro race. Consequently conferentia and

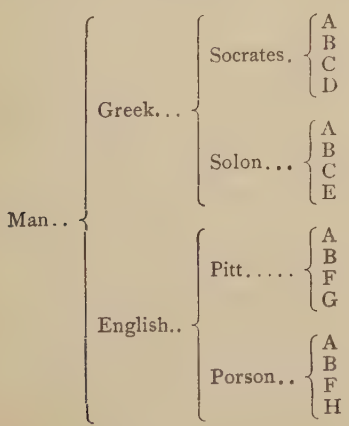
differentia are relative terms. They are names for the difference between the properties that determine a concept as a genus and those that determine it as a species.

4. *Essentia and Accidentia.*—Essentia and Accidentia are technical terms for Essence and Accident, or essential and accidental properties respectively. "Essential" has generally been used to denote the same as the common properties, or what I have called the conferentia, but "accidental" has never been used to denote the differentia. Hence the difference between essence and accidents has not meant the same as the difference between the conferentia and the differentia. Essence or essential has been equivocal, now denoting the conferential as distinct from the differential, and again the essential or more permanent as distinct from the accidental, casual or variable. But as the distinction between the permanent and the variable does not necessarily coincide with the universal and the particular, or the common and the different, it will be best to use conferentia for what is *actually* universal, whether it be essential or accidental, and limit the essential to those properties which the mind selects as the more important qualities of the subject. This will enable us to divide both the conferentia and differentia into the essential and the accidental. Thus the essence or essentia will denote not only what is common to the class, but also in addition those common properties which are *necessary* to the subject or class, while there may be properties that are common or universal, but not necessary

to the class and hence called casual or accidental. For instance, risibility, or concha-shaped ears, or the comparative shortness of the little finger may be universal or conferential characteristics of man, and yet not essential to him. The concept man might be retained though he lost his risibility, the present shape of his ears, or the shortness of the little finger. Accidental properties are, therefore, those which are treated as non-essential to the subject of them and are divided by logicians into the universal and the casual, which is a recognition that the distinction between essence and accident does not coincide with that between conferentia and differentia. The distinction, however, between essence and accident is not so necessary for logic as is that between conferentia and differentia. The latter is the true basis for all classifications and divisions, while that between essence and accident has probably only an ethical value. But the relation between the two pairs of contrast is illustrated in the tabular outline of properties in extension and intension, in which essentia and accidentia are found as divisions of both conferentia and differentia. The nature and functions of the latter and their relation to the determination of the genus and species are represented in the following summarized outline.

In this table the letters of the alphabet represent the qualities that make up the individuals, as A B C D are the qualities constituting "Socrates," etc. But A B C are common or conferential to "Socrates" and "Solon," A B F to "Pitt" and "Porson," while D is the differentia of "Socrates"

compared with the others, E of "Solon," etc. A B C being common to "Socrates" and "Solon," may be treated as the qualities for which the term "Greek" may stand, while A B F being common or conferential to "Pitt" and "Porson" may be represented by the term "English." But here C is the differentia of "Greek" as compared with "English," while A B is common or conferential to both, and may be represented by "man." We have then in the scheme an illustration of the relation both of genus to species and conferentia to differentia, as well as the relation of the two pairs of distinction to each other. Conferentia and differentia become the names of the qualities by which we form the genus and the species.



3d. **Relation between Extension and Intension.**—Extension we have found to denote the *number*,

though indefinite, of the objects denoted by a term, and intension the *qualities* expressed or implied by it. We find also that every term has the property both of extension and intension. Now the intension always represents a certain quantity of attributes, so that we are enabled to express a relation between the quantity of extension and the quantity of intension expressed by a term; that is, the number of objects denoted by it and the number of qualities, though only in relation to a wider genus or a narrower species. Thus "tree" includes mathematically (extensively) all the individuals under "oak," "elm," "ash," "pine," etc., and also denotes the conferentia or common qualities of all these individuals. But "oak" represents a smaller number of individuals than "tree," while it also denotes a larger number of properties, at least one property more than "tree." Hence its intension is larger than tree, while its extension is smaller. A similar illustration can be found in comparing any genus and species: as "quadruped" and "horse." "Quadruped" denotes more individuals than horse, but fewer qualities. It can stand only for the conferentia of all four-footed animals, possibly only one property, and does not indicate the differentia. The species "horse" in this case contains all the conferentia of "quadruped," and something more, the differentia; but it denotes fewer individuals. Hence we can say that the extension of "quadruped" is greater, and that of "horse" is less, while the intension of "quadruped" is less and that of "horse" is greater. The result of this is that we can

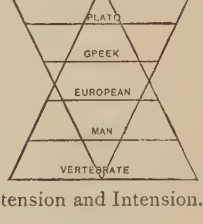
formulate this relation in a law. It is that *the extension increases as the intension decreases, and vice versa*, or *extension and intension vary in an inverse ratio to each other*. We may symbolize this relation by a diagram as follows :

Extension.

FIG. I.

Intension.

FIG. II.



Extension and Intension.

FIG. III.

In Fig. I. the base of the pyramid represents the largest extension, which decreases until it reaches its minimum in "Plato." Fig. II. reverses the order of terms, but still uses the base of the pyramid to represent the largest quantity, in this case of intension, which decreases until it reaches its relative minimum in the term "man." Fig. III. shows the inverse ratio of both properties, the bases and apices being arranged to suit this fact.

This formula has its qualifications. In the first place it may apply only in the majority of cases, and it is not a *necessary* law, except for intermediate classes between individuals and remoter genera. In the second place, no mathematical relation between extension and intension can be determined either absolutely or relatively be-

tween different species, or different genera. The law applies only in the relation between genus and species.

III. **ANALYSIS OF CONCEPTS.**—This is a process of unfolding the meaning and implications of terms. That is to say, it involves the recognition and statement of what is found in their quantitative and qualitative import. We have found that the content of terms consists in the particular ideas they express, and these ideas are their capacity to denote number of some kind and their capacity to denote properties of the things named. Hence analysis is only the conscious statement of all that is involved in their number and property power. There are three forms of this analysis. They are *Definition*, *Division*, and *Partition*. Each of these processes requires separate explanation.

1st. **Definition.**—Definition is that process of analysis which states the *conferentia* and *differentia* of a term or concept. It is commonly called the analysis of the genus and differentia, but previous discussion shows why we use the term "conferentia" instead of "genus." It is, of course, the term for the genus that is named in the definition, but it is not taken in its mathematical or extensive, but purely in its intensive sense to denote the conferentia or general qualities expressed by the term. An illustration of definition would be: "A horse is a domestic quadruped, used exclusively for the purpose of drawing vehicles or performing definite services in the form of work or pleasure." This is necessarily a little indefinite, but it names the genus "domestic quadruped" denoting the con-

ferentia, and the specific qualities which may be taken as the differentia. Taking "rational" as a differentia, we might define "man" as a "rational animal," the term "animal" referring to the conferentia.

The essential purpose of a definition is to make clear and definite the meaning of a term or concept, giving it limits, or circumscribing the field of ideas which it represents. But the word "definition" is often taken in a broad sense to denote any method of indicating limits of this kind, and hence we may recognize three forms of it in common parlance: (a) Etymological Definition, which is nothing more than giving the root derivation of a term; (b) Descriptive Definition, which is any statement of fact about a term or object not equivalent to it, and is not a true or accurate definition of it, and (c) Logical Definition, which is the proper meaning of the term "Definition" in logic. The peculiar nature of this process is that it makes the subject and predicate of the proposition identical, in which the definition is given. The rules which regulate correct logical definition are as follow:

1. A definition should state the essential attributes of the species defined.

2. A definition must not contain the name or word defined. Otherwise the definition is called *a circulus in definiendo.*

3. The definition must be exactly equivalent to the species defined.

4. A definition should not be expressed in obscure, figurative, or ambiguous language.

5. A definition must not be negative when it can be affirmative.

2d. **Division.**—Division is an analysis of the *extension* of a term or concept, or the separation of a genus into its species. Thus we are said to divide the genus "tree" when we name the species under it, as "oak," "elm," "ash," etc., and these again into narrower species. But in determining the nature of the process, and in regulating its correct form, three things must be taken into account: (1) The Principle of Division, (2) The Kinds of Division, and (3) The Rules for Division.

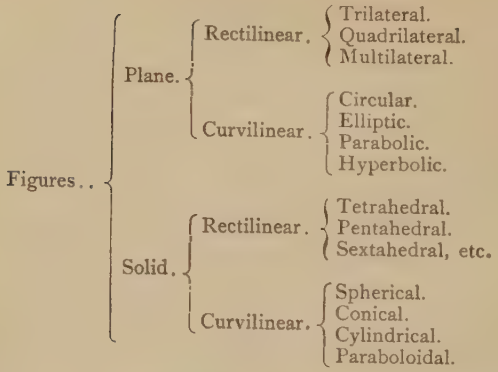
1. *The Principle of Division.*—This is called the *Fundamentum Divisionis*, or principle which shall determine the method of legitimate analysis for extension. It asserts that every logical division must be carried out upon some principle which will be some quality whose differences in kind may serve for distinguishing the species under the genus. Thus in dividing the genus "man" I may take *color* as the principle of division, and determine the species by the differences in kind of color, as "white man," "black man," "red man," etc., or "Caucasian," "Negro," "Indian," etc. Or I might take *language* as the principle of division, and divide "man" into "Aryan," "Semitic," "Turanian," etc.

2. *The Kinds of Division.*—There are, of course, forms of false and forms of true division. The latter are the only cases to which any technical names have been given. One of the false forms is called *Cross Division*. This is the form in which

more than one principle of division has been employed, so that the species given overlap each other. Thus a case of "cross division" would be the separation of "books" into the species, "dictionaries" and "large books," "useful books," "old books," etc. "Dictionaries" and "large books" or "useful books" overlap. Each species must exclude all others. The forms of definition which are technically recognized are two, *Dichotomy* and what I shall call *Polytomy*.

(a) *Dichotomy*.—Dichotomy is that form of division which separates a genus into two species with reference to the presence or absence of a given quality. The two terms representing the species become thus, one of them a positive and the other a negative term. This is the simplest and surest mode of making the division exhaustive. Thus we may divide "animals" into "vertebrate" and "invertebrate"; "Europeans" into "Germans" and "non-Germans"; "cities" into "large" and "not-large" (or perhaps small); or "climate" into "temperate" and "intemperate." This can be carried on indefinitely with either term of the dichotomy.

(b) *Polytomy*.—Polytomy or manifold division is that form of it which separates the genus into species according to the presence of positive qualities alone. Several or many species are usually necessary to exhaust the genus. An illustration would be the division of "quadruped" into "horses," "dogs," "cattle," "sheep," etc., though it may not be strictly scientific. A more accurate instance is the following:



In this instance, we observe that the principle of division may change for each independent class, but not for those that stand as species under the same genus. Moreover, in all such division the genus in relation to the species is said to be *superordinate*, a species in relation to a genus is said to be *subordinate*, and a species in relation to a species is said to be *co-ordinate*. Thus "Figures" is superordinate to "Plane," "Plane" is subordinate to "Figures," and "Plane" is co-ordinate with "Solid."

3. *The Rules of Division.*—A rule of division represents the condition under which the process shall be carried out and so regulates the manner of doing it. Hamilton enumerates *seven* rules, but Jevons reduces them to three, which are all that are necessary for practical purposes. They are as follows :

(a) Every division should be governed by a single division.

(b) The constituent species should exhaust the genus.

(c) The co-ordinate species should be reciprocally exclusive.

3d. **Partition.**—Partition is an analysis of the *intension* of a term or concept without regard to the relation between genus and species, or that between conferentia and differentia. It unfolds the qualitative meaning of a term, or separates a whole into its parts. It is simply a process of describing an object by its qualities or the parts constituting it. There are two kinds: (1) Mathematical or Quantitative Partition, and (2) Logical or Qualitative Partition.

1. *Mathematical Partition.*—Mathematical partition is the analysis of a whole into its parts as expressed in terms of space or time. This means that it looks at things as space or time wholes. Thus "house," "tree," "Germany," are space Wholes, as being objects which occupy space, and "age," "life" (in one of its senses), "the civil war," etc., are time wholes. Mathematical partition when applied to them divides them into the separate parts which make the whole. Thus "tree" would be mathematically partitioned into "roots," "trunk," "branches," and "leaves;" "house," into "walls," "doors," "windows," "rooms," "roof," etc.; "age," into "infancy," "childhood," "maturity," "old age," etc. No regard here is paid to genus and species.

2. *Logical Partition.*—Logical partition is the analysis of a whole into its properties, relations, etc. Thus "tree" would be logically partitioned

into "color," "hardness," "shape," "growth," "utility," etc., or, to put it more systematically, into material and economic qualities with their subdivisions. "Man" may be partitioned into animal and rational properties each with their subdivisions. There is here no reference to genus and species, except as classification of the properties is involved. This process furnishes the aspects in which a concept may be viewed, and enables us to examine the whole content of an idea, concept, or object without distinction of attributes, though they may be systematically viewed at the same time.

3. *Rules of Partition.* — Partition is sometimes considered as a kind of Division, and is treated as that form of it which separates a whole into its component attributes instead of its component species. This is a legitimate view of it, though it is treated co-ordinately with division here in order to emphasize the use of it for the purpose of furnishing the distinct aspects of a theme in discourse which are not so easily illustrated by division into species. The principles which regulate it are much the same, though practical purposes are served by the mention of only a few of the more important ones.

(a) The analysis of the intension should be exhaustive.

(b) The properties considered should be classified and distinguished according to the principles of division.

CHAPTER IV

EXPLANATORY DISCOURSE

I. **INTRODUCTION.**—We have found what the logical processes are which represent the analysis of a conception or theme into its parts or meaning, and we have now to examine the application of them to discourse and more especially to outline the principles which regulate the constructive processes of thought expression. All discourse, whether literary or explanatory or both combined, is most satisfactory to the mind when it is systematic and orderly. The impression produced upon the mind by such discourse is more distinct when it follows definite principles and purposes. Its efficiency in both the æsthetic and the logical field is greatest when it is systematic. The explanatory stage, however, is but the preliminary step toward confirmation, which will have to be discussed somewhat later. But at present we have to examine how the expression of ideas without proof can be systematized, and to show what methods are necessary to that end.

There are two general processes involved in explanation. They are *Analysis* and *Synthesis*, as I have named them. Less technically, the two processes may be called the discovery of the parts of

a complex idea, and the arrangement of them to give a clear conception of them as wholes.

II. **ANALYSIS OF THEMES.**—The analysis of a conception or theme must precede and condition the orderly synthesis or composition of materials to make complete discourse. It consists of the several processes of Definition, Division, and Partition. But these must be applied, not for their own account, but with reference to some other end than themselves. Hence the special way of treating any given theme, in so far as these processes are concerned, will vary with the subject-matter and its complexity. But nevertheless some general rules and conceptions can be followed in all cases.

The analysis of a theme is simply the selection of all the parts, incidents, attributes, relations, and classes expressed by it. The great object of the process is to indicate the compass of the subject and to determine the right order of procedure in dealing with it. It may be briefly defined as the *process of skeletonizing a subject.* This is a process of mapping out the divisions and topics calculated to give a clear and exhaustive treatment of a theme. The order of procedure must be that of Definition, Division, and Partition. The functions served by all three of these methods are those of indicating clearly the limitations under which the explanation is to be taken. They bring thought and expression down to definite and circumscribed limits. The manner in which such a skeleton is to be used will depend upon the tastes and object of the writer. First it may be used merely to pre-

pare the order of treatment to be given a theme, without being embodied as a skeleton in the body of the discourse. Second, it may be incorporated with the introduction as an index to the reader of what the logical conception of the whole is to be. The first form leaves to the reader the discovery of the outline. This often has its advantages where the object is merely to have system without producing the impression that the discussion is for the sake of the system alone. Third, the outline may be distributed throughout the treatise or discourse, especially where we are dealing with the student mind, partly for the purpose of training in habits of logical and systematic conception and thinking, and partly to aid in the clearer comprehension of the subject. But in all cases of explanatory discourse, as here considered, whether the outline be embodied in the discourse or not, it should have a place in the writer's mind.

In suggesting rules for practice, however, it is important to keep in view the kind of discourse to which they are meant to apply. I have intended the process of applied analysis to be limited to what I have called *explanatory* as distinct from *literary* discourse. Literary prose I have intended to be a sphere of expression, not designed to convince or instruct the reason as its main object, but, like poetry, to be governed by *æsthetic* rules and ends. Of course, both poetry and literary prose may combine logical with æsthetic objects, and when they do must be governed in the same proportion by logical principles. But I am here laying down rules to apply only to what I have

chosen to call explanatory discourse, which has for its chief object to *impart* or *communicate ideas* for the instruction of the intellect, and either does not consider æsthetic taste at all or makes this of secondary importance so far as that end is concerned. The term explanatory discourse, therefore, stands for that form of it which is exclusively employed with logical processes and logical objects. The rules for literary or æsthetic discourse may be wholly different. Of them I do not propose to treat. Outline and skeleton analysis may not be necessary in æsthetic literature pure and simple, but only when combined with the logical and explanatory. But for the latter this process is essential for clearness, effectiveness, and comprehension, and more especially for the communication of *systematic* ideas, which is its object. All rules of procedure here adopted, therefore, will leave the student free to accept any laws of literary taste that æsthetics require. We are here concerned only with that expression of thought that aims to reproduce the rational order which the mind finds by reflection on the world and phenomena. This order represents the unity of logical relations, involving the proper selection of ideas, topics, and marshalling of material for the purpose of influencing conviction.

1st. **Application and Use of Definition.**—The first step in explanatory discourse is definition. The nature of this process has already been indicated and it only remains to show how it is to be used and what its functions are in systematic thought and expression.

As explanation is the systematic arrangement of the facts involved in a theme, the first duty on the part of a writer is to define his subject. The definition must include a clear idea of the term or terms in the theme, and of the proposition when the theme is so comprehensive. Thus if the subject of a descriptive discourse is "Houses," the first thing to do will be to define the general term "house." The definition may be made to include the historical and etymological meaning of the term itself, but should terminate in the logical statement of the conferentia and differentia denoted by it in order that it may not want in clearness. If the theme be a proposition, both terms or all terms in it may be subjected to the same process, and the meaning of the proposition of the whole determined. So much for the first step.

The function of definition is to give *limitations* to the discourse and to aid the comprehension of those for whom the communication of ideas is intended. It brings to specific notice the properties expressed by a term, and makes clear the most essential qualities involved in its meaning. It thus conveys an idea, definite and clear, to the person receiving the information communicated, and more especially indicates the facts, things, or qualities not to be considered in the use of the term. This latter function is what is meant by giving an idea or term limitations. Apart from definition it might mean anything. But this process shuts out, at least by implication, all that the thing is not, and also distinguishes, in what it is,

between the essential and the unessential marks constituting an object. Thus if I am asked to discourse upon the theme "Man," my first task must be to indicate, at least in the most general way, for what the term man essentially stands. I may say that "Man is that genus of organized beings which show the attributes of rationality," etc., or that he is "that species of biped which exhibits certain peculiar mental and moral habits of life," etc. The distinctive qualities, of course, would have to be named. But the process would bring out the aspects of man and his nature which were to come under consideration in the discourse. Besides, it decides the compass and range of the discussion, showing just what conception and facts are to be considered in the theme. Ideas thus have definiteness and clearness.

It is not necessary to indicate in the outline of a theme that the process of definition is going to be followed. This may be done in text-books and theses designed for a certain kind of instruction. But the main thing in all cases is the application of the process as the necessary means of orientation in a subject; that is, the necessary means of making clear the general nature and scope of the subject. It may be applied at every step in the development of a theme.

2d. **The Application and Use of Division.**— Division was found to be the analysis of a conception or theme into its species or kinds, as "man," into Caucasian, Negro, Malay, etc. In discourse this process is to be applied to the determination of the general parts of the subject,

though in certain kinds of discourse Partition will take its place. But in most, if not all, themes it will have a function to perform. Thus if the subject be "Books," the mode of division for the discourse will depend upon the aspect of the subject to be considered, and the topics for chapters or sections selected accordingly. If "books" are to be discussed from the point of view of their subject-matter, they might be divided into philosophic, scientific, literary, religious, etc., as representing the distinct kinds to be treated separately. If the theme is to be considered in respect of their form, the division might be folios, quartos, octavos, duodecimos, etc. If the question concerns their relation to civilization the divisions might be scientific books, political books, artistic books, religious books, etc. In all, they are classified and discussed with reference to some principle of division that determines the point of view to be considered. If again, for instance, the theme be "Protection," we could divide it into chapters on Protection of Manufacturers, Protection of Agriculture, Protection of Trade, Protection of Labor, etc. Or in another form, if the question is as to methods, it can be divided into Revenue Protection, Bounty Protection, Prohibition of Imports, etc. In all these cases separate applications of the main principle are concerned and require separate treatment.

The chief function of division is to reserve for distinct discussion those special aspects of a subject which are not immediately recognizable in the general definition, but are found in the differ-

ences that mark the species. Definition states what characterizes the whole class without regard to species, and so deals with the essential intension of a conception. Division, on the other hand, dealing with the extension, recognizes the differences characterizing the species under the genus. Thus, in the subject of protection, the form of it denoted by bounties involves certain incidents and influences not noticeable in its application in revenues. Hence the reservation of this form of it for separate treatment offers an opportunity to discuss this aspect of it wholly distinct from the incidents common to every kind of protection.

3d. **The Application and Use of Partition.**—The chief function of Partition is the presentation of the *aspects* of a theme. As already shown, it is the division of a concept into its attributes, implications, and relations, and so the analysis of its intension. This is only an application of the principles of division to the properties and relations of a thing instead of its species, and affords an opportunity to systematize discourse in regard to the implications of a theme. Certain incidents can be made to centre about a given attribute or relation that might otherwise be scattered about through the discussion without relevancy or proper order. Partition thus presents a system of *topics* distinct from species as centres of gravitation for relevant matters of interest to that aspect. Thus if the theme be "House," I may partition it into origin, style, utility, etc., or foundation, walls, floors, windows, etc., and discuss the appropriate

incidents connected with each aspect. Or again, if the theme be "Protection," it may be partitioned into history, administration, effects, etc., or motives, application, results, etc. "Books" might be partitioned into such topics as form, size, style of print, binding, cost, utility, etc. Each topic can be made the subject of a section or chapter, according to the purpose of the writer.

4th. **Methods of Applying Analysis.**—The one great object of analysis is clearness and systematization of thought and discourse. But it can be carried out in a way to make discourse too mechanical and to bury the thought in a mass of outline. A proper mean should be used in the process. There are three ways in which topical analysis can be applied: (1) We may outline the whole subject in the introduction and omit farther express analysis from the body of the discourse, using only so much as is necessary for the chaptering. This will avoid all mechanical appearances in the discussion. (2) We may distribute the outline throughout the discourse so that each chapter and section will represent a distinct recognition of the separate topics treated. Whether mechanical or not, this will be necessary for certain kinds of discourse. (3) We may make the analysis of a theme and follow it without any explicit recognition of it in a mechanical form, but leaving it to be discovered by the reader, if necessary. This last method obtains the advantages of systematization and logical discourse without its mechanical features.

The method of applying the analysis will not always be the same. (1) It may sometimes be

Division alone and (2) sometimes Partition alone. At others, and perhaps in most cases, it will be best to apply both Division and Partition together in forming the outline. These may be combined in various ways. Division may determine the topics for the main parts of the discourse, and Partition the topics for the subordinate parts. Sometimes even both may be combined in the main divisions, according to the degree of importance attaching to the topics so arranged. This procedure may violate mechanical correctness, but economy of analysis may, at times, justify such a departure from mechanical and logical accuracy. But generally Partition can be applied to determine the topics and subdivisions of the subordinate divisions of discourse, as well as often determining those of the main parts.

III. **SYNTHESIS OR COMPOSITION.** — Synthesis or Composition is the arrangement of the matter of thought about the topics which analysis presents. It requires Proof or Confirmation for the completion of the process. But this part of it cannot come under consideration at present, nor until we have studied the nature of reasoning. Only so much of the process can be explained here as concerns the arrangement of ideas to present a clear idea of the object or theme which is the subject of discourse. The topics are mere centres of gravity for the complex matters of thought and so afford a principle of cohesion for them, and composition is a process of selecting and arranging the particulars of knowledge about their appropriate topics or centres of gravity. We may divide it, for

convenience, into three kinds: (1) Description, (2) Narration, and (3) Exposition. Description applies, in the technical meaning given it here, to *space* wholes; Narration, to *time* wholes; and Exposition, to *thought* wholes.

It is important to remark that there is no essential difference between the processes of description, narration, and exposition. The same general laws govern all of them. The differences connected with them are in the objects or themes considered, and different terms are applied to the discourse in order to recognize the differences in the subordinate features of it. Certain subsidiary rules apply to discourse on space wholes that do not apply to time and thought wholes, as they are here called. The same is true of either of the latter compared with the others. But the general process of arranging materials is the same in all of them, and gives rise to the same laws of procedure.

1st. **Laws of Composition or Synthesis.**—A law of Composition is a rule regulating the process of explanatory discourse so that it will exhibit the greatest possible clearness and systematization. It is simply a condition of right procedure, and affords a criterion for determining the merits of the discourse. Such a law represents some idea according to which the selection and arrangement of material have to be made.

1. *Law of Selection.*—The law of selection is that condition which requires us to distinguish between the matter that is relevant and that which is irrelevant to the theme or any part of the theme

which is under consideration. It is not all of our ideas about a given subject that can receive equal attention or be used with equal freedom. The selection of ideas and matter of thought pertaining to a subject should be directed with reference to the manner in which the theme is analyzed. Much can be neglected altogether, unless the purpose be to deal with every aspect of the subject, and even then selection must be made to distinguish between what pertains to one part and what pertains to another. Thus if the theme be "House," I should select the things to be said about it with reference first to the definition of it, and second with reference to each aspect of the general theme chosen for separate treatment. If I treat the subject as denoting some form of residence, I should exclude all matters pertaining to houses for business, names of dynasties, or bodies of legislators. I should select only matter bearing upon or included within the notion of residences. Or if the theme be "The Moral Influence of Art," I should exclude all matter dealing with mere history of art. In fact, its history in every aspect might be ignored, unless features of it could be given relevance to its moral character. Similarly all discussion of execution, finish, and style could be and ought to be disregarded, and only the ideas and their embodiment and suggestion selected for developing the theme. Relevancy is the distinctive criterion of the process.

2. *The Law of Unity.*—The law of unity is that condition of explanatory discourse which regulates the arrangement of material after it is selected.

Selection determines what is relevant to the general theme. The law of unity determines the arrangement of this matter in its proper relation to the subordinate topics, so as to give system to the whole. Besides, it is constructive in its arrangement, while selection only prepares the way to this unity. Relevancy is also a principle here, though it is constructive as well as selective. The order of arrangement for producing unity will vary with circumstances. Now it may take one order and now another, depending upon the occasion, the object, the state of public opinion, and whatever is required to make the discourse effective. Sometimes I may put the most important matter first, and sometimes the less important, making the presentation cumulative in its impressiveness. The discretion of the writer and the nature of the circumstances must regulate this. But always relevant arrangement must be the rule of construction. Thus, if I am discussing the subject of "Protection" and the two subordinate topics under it, revenue and bounty protection, I should not arrange facts illustrating one of these topics under the other, though the facts under both have also a bearing upon the general theme. But facts and figures on bounties should be arranged to illustrate the influence of this specific kind of protection, rather than the general process. Nor should I confuse with the facts relevant to these subordinate topics facts that have only a general significance. Again, if I am explaining the theme "Cities," I should not confuse matter relevant to special cities with that which is relevant to the

general conception. Everything in its place is as good a logical as it is a domestic maxim.

2d. **Forms of Composition.**—These have already been named as Description, Narration, and Exposition, according as they are occupied with space, time, or thought wholes as themes. We have also said that essentially they are the same in method, and only certain interesting differences in the themes or objects of the discursive treatment can justify separate names for them. The general laws regulating them, as we have said, are the same. But the distinction of themes requires certain modified rules of some importance in the management of materials, and hence there will be some convenience in the use of these terms in spite of essential identity in their content.

1. *Description.*—Description is that process or form of explanation which exhibits the properties, attributes, and relations of spacial objects in their proper order. Even mental and related phenomena will not be excluded from this definition inasmuch as they may be treated as concomitant properties of spacial wholes. This description, however, may take two forms, according as it deals only with spacial relations or only with properties of a non-spacial character. They correspond to *mathematical* and *logical* partition. Mathematical description exhibits the parts of a whole not coinciding with each other. For instance, the mathematical description of a "house" would take in their proper order the separate and individual parts of the house, such as foundation, walls, doors, windows, roof, furniture, etc., and

exhibit their form, structure, functions, etc. Logical description, on the other hand, will exhibit the properties and functions of an object which may occupy the same space, and so are to that extent independent of that property. For instance, the logical description of a "house" will represent its form, size, appearance, artistic character, cost, use, etc., without regard to mathematical divisions.

The methods of procedure or rules regulating the process, in order to meet the demands of the laws of unity and selection, are much the same, with slight variation, for both mathematical and logical description. Both require that the most important parts or properties be taken first, and the subordinate matters afterward. But in mathematical description no principle of logical division can be adopted. The properties and relations named cannot be grouped, but must be taken, as it were, in a serial order. In logical description, however, something of classification can often, if not always, be adopted, inasmuch as the properties of a subject can, at least generally, be classified. Thus in the logical description of a "house," I should group together all that is to be said in regard to form and color, as being both of them visual properties. If the theme be "man" we should group together the physical qualities and not confuse with them any of the mental. Subgroups of each of these can also be taken in order to introduce further order into the description. This will involve the simultaneous application of Division and Partition; of Partition to the sub-

ject and of Division to its properties as classified. In many cases also mathematical and logical partition can be applied at the same time in combination. Thus by first classifying the properties of "man" as physical and mental, and if we desire further to subdivide each group, the physical into form, size, functions, complexion, etc., and the mental into intellectual, emotional, and moral, we might then apply mathematical partition to the form and size, reserving any other process for functions and complexion, while logical partition would apply to the mental properties. Clearness and convenience must be the guides in each step.

2. *Narration.*—Narration is that process of explanation which presents a theme in its time relations, or which exhibits events in their proper order. It will be seen from this definition that the process is essentially *history*, no matter what the theme may be. This may also have two kinds: *mathematical* and *logical* Narration. Mathematical narration will divide the whole into certain periods marked by chronological divisions of importance, and exhibit all events within them in their order, perhaps with such subordinate chronological divisions as are necessary or convenient for clearness. Each period forms a topic about which relevant and appropriate events shall be grouped. Thus take the theme "England." First I may decide whether I shall treat the theme geologically or politically, or in any other way. The time divisions are likely to be different in each case. Taking it politically, I select those dates which best represent the idea and its development which

I am seeking to elucidate. The usual chronological divisions of English history will illustrate this process. Logical narration will divide a historical theme and its periods into the various aspects which constitute them as wholes before narrating the details. The narration may, at least to some extent, ignore chronological limitations in this operation, though applying them to each separate aspect. Thus taking England again and its general history instead of presenting all forms of its development in their exact chronological position, I can divide this history for the whole and each period into political, industrial, religious, scientific, æsthetic, and moral aspects, and narrate within these limits the facts and events appropriate to each topic. This will give the best logical form and order to the discourse, though there may be other reasons at times for a chronological order without these divisions. In pure mathematical narration the principle must be chronological order. In pure logical narration the principle must be logical classification and connection of events without regard to other events in the same time. In many instances, however, it is possible and will be proper and important to combine both processes. This may be done in various degrees according as the object of the narration permits it.

3. *Exposition.*—Exposition is that process of explanation which exhibits a theme as a logical or thought whole independent of time or space relations. It is a process that deals largely, if not wholly, with abstract and general conceptions,

while pure Description and Narration will be occupied with concrete things, and will consider individual objects and their qualities without distinction between the essential and accidental. But Exposition when dealing with thought wholes must limit its process to the essential properties or events brought together. Every general term or concept can be brought under this process, which will be a presentation of the theme in respect of its properties and related events according to logical partition alone. It will therefore be a process of exhibiting the nature of the subject considered. The order of selection will represent the most important properties or facts concerned, according to the point of view maintained. The themes to which Exposition will be applied and to which Description and Narration might not require to be applied, or might not be possible, are such as "science," "philosophy," "history," "religion," "politics," etc. Even more concrete conceptions, to which Description and Narration might apply, can be made the subject of Exposition, such as "man," "quadruped," "forest," "army," "the age of iron," "the Renaissance," etc. But in its pure form it limits the process of explanation to the properties and events constituting an abstract whole, and consists in the arrangement of material about topics determined by the logical division and partition of the theme. Such conceptions as "government," "poetry," "life," "virtue," are highly abstract, not because they denote intangible things, but because of their exceedingly general charac-

ter. But every general term, taken as already explained, may also be an abstract or thought whole, in that the group of properties denoted by it has required intellectual as well as sensational functions to produce them. Exposition is the process of unfolding their full content and meaning, and demands the logical analysis of the theme and the arrangement of subordinate matter in its due relation to the appropriate topic.

IV. **CONCLUSION.**—The only important remark in the conclusion of this subject is that themes will often be found capable of any or all three forms of composition. Some conceptions possess time, space, and thought relations, so that it is a matter of convenience whether one or the other of the forms of Composition is used. In all of them the essential step is the analysis, and then a perception of the relevancy of the matter arranged.

CHAPTER V

PROPOSITIONS

I. DEFINITION.—In the expression of our ideas or thoughts we are accustomed to combine terms and concepts in a way to express some definite meaning. Such a combination of terms is called, in common parlance, a proposition, or sentence. But for the purposes of Logic we require to be more accurate in our account of the matter. Hence a Proposition is *any affirmation or denial of an agreement between two conceptions.* For instance, "Gold is a metal" is a proposition which expresses an agreement or some measure of identity between "Gold" and "metal." "Man is not a quadruped" denies this agreement. Every proposition consists of two terms: namely, the *Subject* and the *Predicate*, with a connecting element in the simplest form, which is called the *Copula*. This Copula is some form of the verb *to be*, with its usual adjuncts. In such propositions as "Napoleon ruled France" the copula is not expressed, but may be said to be implied. The verb and its object constitute the predicate, and the meaning of the proposition can be expressed equally well in the form, "Napoleon was the ruler of France." The subject is that of

which something is affirmed or denied. The predicate is that which is affirmed or denied of the subject. The logical subject and predicate may contain more terms than would be called by these names in Grammar. They may be represented by any number of terms, provided they constitute a single concept.

II. **DIVISIONS.**—Propositions may be divided in a variety of ways, according to the object to be served by the division. In all instances, however, Logic requires that the divisions mark a function that is represented in some of the processes of reasoning. But in regard to their general import I shall divide them into Univocal and Equivocal Propositions. These terms univocal and equivocal I shall give a definite meaning for the purpose. They could also be called simple and ambiguous.

1st. **Univocal Propositions.**—Univocal propositions are those whose meaning is definite and clear, and whose form of expression represents the normal relation of subject and predicate, and do not imply complementary propositions. They are further subdivided into several forms.

1. *Logico-Grammatical Propositions.*—These are propositions which have common uses and names in Grammar and Logic. They are sometimes divided into *Categorical* and *Conditional*, with a subdivision of the latter into *Hypothetical* and *Disjunctive.* Sometimes Conditional and Hypothetical propositions are not distinguished at all, and the Disjunctive are treated as a distinct class of propositions by themselves. The latter division I should regard as the better, especially as each

proposition may be said to determine a form of the syllogism, the *Categorical*, *Hypothetical* or *Conditional*, and the *Disjunctive*.

A *Categorical* proposition is one in which a statement or assertion is made without any qualifying conditions. For instance, "A is B," or "Man is mortal." The fact in such cases is stated to be certain or known without doubt. It may be only an imaginary fact yet, the assertion is in the form of reality.

A Hypothetical or Conditional proposition is one in which the assertion is made to depend upon a supposition of some kind; as, "If A is B, C is D," or "If it rains, the ground will be wet." The first clause of the conditional proposition is called the *antecedent*, the second is called the *consequent*. The symbols of such propositions are *if*, *even if*, *provided that*, *although*, sometimes *when*, and any form of expression denoting a condition, such as *had* or *were* introducing a proposition that is not a question. There are four forms in which the conditional proposition can be expressed, two of which are affirmative, and two of which are negative. They are as follows:

(a) If A is B, C is D. (b) If A is not B, C is D. (c) If A is B, C is not D. (d) If A is not B, C is not D.

A Disjunctive proposition is one which implies or asserts an alternative in the relation between the subject and predicate; as, "A is either B or C," or "Metals are either hard or soft." The symbols of the disjunctive proposition are *either — or*. They are its symbols, however, only when

they denote mutual exclusion between the alteratives, and not when they denote merely the sufficiency of one or the other of two facts to account for a phenomenon without excluding the existence of the alternative circumstance; as, "Gibbon was either very industrious or very talented." The disjunction, however, when it is complete and formally correct, means that the connection between subject and predicate must be only one or the other of two things. In the proposition A is either B or C; the question whether A is B or whether A is C is indefinite or undecided, but it is definitely one or the other, and hence the proposition means either that A is B and is not C, or that A is not B and is C, or that A is C and is not B, or finally that A is not C and is B. Hence it means that *if* A is B it is not C, etc. This is the reason that it is usually classed as a conditional proposition. But if it be closely examined it will be found to contain both categorical and conditional elements. It is categorical in its *form*, or mode of expression, and conditional in its *matter*, or meaning. The relation of form and matter in the three propositions may be summarized as follows:

Propositions { Categorical = Assertory in form and matter.
Conditional = Hypothetical in form and matter.
Disjunctive = Categorical in form, but conditional in matter.

2. *Logico-Qualitative Propositions.*—Propositions may be divided into *Affirmative* and *Negative*, according as they affirm or deny the agreement between subject and predicate. This relation is

called or determines what is regarded as their *quality*. An affirmative proposition asserts an agreement between subject and predicate ; as, "Gold is yellow," or, "Doves are birds." A negative proposition is one which denies an agreement between subject and predicate ; as, "Men are not quadrupeds," or, "Gas is not heavy." The affirmative proposition has no express verbal sign or symbol. The symbols of the negative proposition are *not*, *no*, and *none*, the first being attached to the copula or verb, and the last two to the subject of the proposition ; as, "No trees are animals," or, "None of the men was tall."

3. *Logico-Quantitative Propositions.* — Propositions are divided according to the *quantity* expressed by the subject. The usual division is into *Universal* and *Particular* propositions. This distinction is generally determined by the question whether the predicate is affirmed or denied of the whole or of a part of the subject. Hence it is said that a Universal proposition is one in which the predicate is affirmed or denied of the *whole* of the subject ; as, "All men are mortal," or, "No men are horses," and a Particular proposition one in which the predicate is affirmed or denied of a *part* of the subject ; as, "Some men are wise," or, "Some negroes are not white."

But the difficulty with this definition is that there is a sense in which the predicate is affirmed or denied of the *whole* of the subject in the particular as well as the universal proposition. For the nature of the subject may include what is known in grammar as the "logical" subject, which con-

sists of all the terms constituting a complex conception and standing in the relation of "subject" to the proposition. In this sense the predicate of a particular proposition is affirmed or denied of *the whole of its logical subject*, but of only *a part of the grammatical subject*. If, therefore, we could say that a universal proposition affirms or denies the predicate of the whole subject, grammatical *and* logical, and a particular proposition, of a part of the grammatical subject only, we should seem to have avoided the difficulty. But it returns again in such propositions as "All good men are worthy of respect," which would be particular according to the definition: for the predicate is affirmed of only a part of the grammatical subject.

It would, therefore, be better for the purposes of definition either to divide propositions into *Definite* and *Indefinite*, or to define universal propositions as affirming or denying the predicate of the whole of a *definite* subject, and particular propositions of the whole of an *indefinite* subject. This is what is actually meant by the two kinds of propositions, and only technical difficulties in definition would ever lead to any discussion of the matter. But with the condition that universal and particular shall express just this distinction between definite and indefinite subjects, we may accept the current division of propositions and interpret the common definitions accordingly.

The signs of the universal proposition, when formally expressed, are *all*, *every*, *each*, *any*, and *whole*, or words with equivalent import. The signs of particular propositions are also certain

adjectives of quantity, such as *some*, *certain*, *a few*, *many*, *most*, or such others as denote *at least a part* of a class.

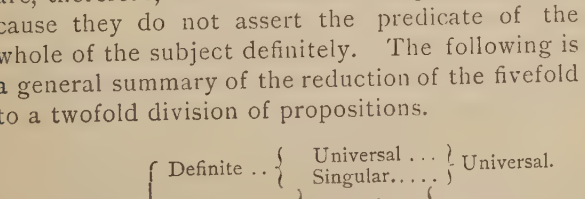
But this twofold division of propositions into universal and particular is the result of a reduction from a *fivefold* division which is frequently adopted by logicians. Thus propositions are frequently divided, according to quantity, into *Universal*, *General*, *Plurative*, *Particular*, and *Singular*. The first and the fourth, Universal and Particular, are the same in definition as those by the same name in the twofold division, while the other three may be treated as reducible to one or the other of these two. This can be shown as follows :

A Singular proposition is one in which the subject is a *singular* term, and hence is quantitatively definite in its subject ; as, "Napoleon was a great general." Here the predicate is affirmed of the whole of a definite subject, and hence, according to the definition, it is possible to treat the singular proposition as a Universal. This is true, however, only in the formal laws of the Syllogism, and of Immediate Inference, but is not applicable in the process of Opposition, where Singular propositions must remain such.

A General proposition is one in which the quantitative meaning of the subject is ambiguous : as "Man is intelligent." We cannot tell from the form of statement whether this proposition means that, "*All* men are intelligent," or that "Men in general (normal men) are intelligent." The proposition is capable of either interpretation, and, according as we *think* of *all* or *some*, when using

it, is universal or particular. *Formally*, it is only particular, because it does not expressly assert *all*, but we often supply this conception in thought. For definite logical purposes all such propositions ought to be reduced to definite formal expression to bring out their intentional meaning either as universal or as particular propositions, before we are safe in using them in an argument. All such propositions as the following are general: "Metals are useful," "Trees are beautiful," "Religion is a source of consolation," "Diamonds are brilliant," "Paper is cheap," "Governments are necessary."

A Plurative proposition is one in which the subject is quantified by *most* or an equivalent term; as "Most ruminants are horned," and require mention only because of a peculiar syllogism which is valid in spite of its composition from particular premises. Plurative propositions are undoubtedly particular. They, however, affirm or deny definitely the predicate of more than the half of the subject, but indefinitely in regard to which half is meant by the term "*most*." They are, therefore, to be classified as particular because they do not assert the predicate of the whole of the subject definitely. The following is a general summary of the reduction of the fivefold to a twofold division of propositions.



Some caution must be observed as to the meaning of several terms which are ambiguous in defining propositions. Thus the term *all* is equivocal. It is sometimes used collectively instead of distributively. Thus in the proposition, "All the angles of a triangle are equal to two right angles," it means, not "all" or each of the angles taken separately, but collectively. This peculiarity, however, does not affect the universality of the proposition.

Again the term "particular" does not denote an individual or singular subject. It often denotes this in common parlance, but this is not its import in formal logic. Here it means an *indefinite part* of a whole. This meaning is explicitly indicated by the use of the term *some*, which, in pure particular propositions means *some and it may or may not be all.* The predicate is affirmed of an indefinite part of the subject, and nothing is either implied or stated about the rest of this subject, or conception, of which only a part is expressly indicated in the proposition.

The quality and quantity of propositions may be combined in the classification of them, so that we shall have universal affirmative, universal negative, particular affirmative, and particular negative propositions. It has been customary to denote each of these classes by an abbreviated symbol. The first four vowels of the alphabet have been chosen for this purpose—A, E, I, and O. The symbol of the universal affirmative is A; of the particular affirmative, I; of the universal negative, E; of the particular negative, O. These

letters shall be henceforth used for greater convenience to denote their proper propositions. It may be interesting to remark that A and I occur in the Latin *affirmo*, and E and O in the Latin *nego*, from which scholastic writers took them for mnemonic purposes, but the fact has no special significance.

The following summarizes the result in tabular form :

Propositions.. { Universal.. { Affirmative = A. / Negative = E. } / Particular.. { Affirmative = I. / Negative = O. }

2d. **Equivocal Propositions.**—Propositions obtain a double or equivocal meaning in three ways : *First*, by the equivocal use of certain terms ; *second*, by the inverted position of certain terms and clauses ; and *third*, by the double meaning of the proposition as a whole, even when there is no ambiguity in any of the terms composing it. The first and the third of these influences affect propositions in the same way, giving them that double import which enables us to speak of an implied proposition as the complement of the one given. These may be called *Duplex* propositions because they are susceptible of analysis into two distinct judgments. Those due to the second cause may be called *Inverted* propositions. The equivocal nature of these propositions, however, whether duplex or inverted, is not so much in their content or meaning as in regard to their relation to

certain rules for formal logic. In the processes of reasoning we are accustomed to treat propositions according to certain definite rules regarding their form and meaning. In equivocal propositions, however, we have either to modify these rules or to reduce these propositions to their univocal equivalents before excepting the meaning in which they occur.

1. *Inverted Propositions.*—These are of two kinds. *First*, those in which the inversion is of the subject and predicate; and *second*, those in which it is of some relative clause. In regard to the first of these, an example, such as can frequently be found in poetry, is, "Full short his journey was," or "Great is Diana of the Ephesians." In such cases the order of subject and predicate must be changed before the proposition can be dealt with according to the formal rules of reasoning in so far as they are represented in the ordinary rules of discourse. In regard to the second class, a part of the subject may sometimes be mistaken for a part of the predicate, when it is described by a relative clause standing at the end of the sentence; as, "No man is honest who cheats his neighbor," or, "No one is fit for a king who cannot rule himself." The real subjects in these propositions are, "No one who cheats his neighbor," and "No one who cannot rule himself," so that we cannot follow the rule of mere spacial position for determining them; and hence unless we keep this fact in mind such instances would give trouble in determining the validity of certain forms of reasoning as will appear when that subject is discussed.

2. *Duplex Propositions.*—A duplex proposition is one which implies a complementary proposition, and so requires to be analyzed into two distinct judgments. There are three kinds: *Partitive*, *Exclusive*, and *Exceptive*. The chief characteristic of them is that *the complementary proposition implied by them is of the opposite quality of that which is asserted in the given instance.* If the original proposition be affirmative the complementary proposition is negative, and *vice-versa*. This will be important to keep in mind, because the process of reasoning will be affected as much by the implied proposition as by the original, as will be illustrated.

(a) *Partitive Propositions.* — Partitive propositions are those whose subjects express a part of a whole of which the subject of the implied proposition is the complementary part, and are determined by the terms "*Few*," and the secondary uses of "*Some*" and "*All-not.*" The term "*Most*" can also be included. "All-not," instead of being the symbol of a universal proposition, is often conceived as the same as "Not-all," and hence indicates a particular proposition. For instance, "All metals are not denser than water" and "All men are not red-haired," may mean "Not all metals are denser than water," and "Not all men are red-haired."

Strictly considered according to form of expression, the original propositions are E in *form*, but in *matter* of thought they are I propositions with O implied. When we say "Not all men are red-haired," or "All men are not red-haired," the latter being taken as the equivalent of the former,

though formally ambiguous, we mean that "Some men are red-haired," and "Some men are not red-haired." Whichever of the two I have in thought, the other is implied.

The term "*Some*" is subject to a similar ambiguity. It may denote now "*some but not all*," and again "*some at least, and it may or may not be all.*" The latter is the proper meaning for pure particular propositions, and the former is the meaning for duplex partitive propositions. Thus the propositions, "Some metals are precious," especially if, in speaking, the emphasis be upon the word "*some*," may mean that "Some metals are precious," and at the same time also that "Some metals are not precious." This occurs when the term is equivalent to "*not all*" or "*only a part.*' In such instances it implies its complementary opposite, so that it means I and O at the same time. If the original be I, it implies the simultaneous use or assumption of O; and if O, it implies I. The proper use of the term, however, for pure particular propositions when considering the usage of formal logic in the processes of argument, is that in which it denotes "*some and it may or may not be all.*"

The importance of this will appear in considering the subject of Opposition. But in actual reasoning, or the discourse of actual life, we must be on the alert for the ambiguity to which the term is incident, and so be ready to detect the fallacy which it may occasion.

A third proposition of a partitive and duplex nature is that introduced by "*Few*," and "*Most;*"

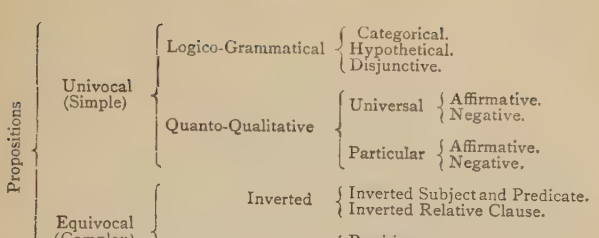
as "Few men can be President," or "Few cities are as large as Vienna," or again, "Most men are civilized." In these we mean also, that "Most men cannot be President," or that "Most cities are not as large as Vienna," and that "Some men (a few) are not civilized." Such propositions imply a complementary opposite, because the terms "*Few*" and "*Most*" denote *a part, but not all.* The expression "*a few*" is sometimes synonymous with the partitive "*few*," and sometimes synonymous with the particular "*some*," and so varies between being a symbol of partitive and a symbol of pure particular propositions. But "*few*" always introduces a proposition which implies the complementary opposite, and so has the meaning of I and O together.

(b) *Exclusive Propositions.* — Exclusive propositions are introduced, or have their meaning determined by "*only*," "*alone*," and "*none but.*" They are, therefore, those which limit the predicate to the subject, and are illustrated by such instances as, "Only Caucasians are white," "Elements alone are metals," "None but honest men can be trusted." When we say that "Only elements are metals," we do not necessarily mean that "All elements are metals" (for this might not be true), but that the class "metal" belongs exclusively to the class "elements," and that it cannot be in any class excluded from that of "elements." Hence the meaning of the proposition is brought out either by its simple converse, or the complementary opposite proposition which it implies. The exclusive proposition must be reduced to one of

these when testing any special case of reasoning. Thus, "Only Caucasians are white," must be reduced either to "All white men are Caucasians," or to "All non-Caucasians are not white" when testing the process of formal reasoning with such propositions.

(c) *Exceptive Propositions.* — Exceptive propositions are those which are introduced by such terms as "*All except*," "*All but*," "*All save*," etc. For example, "All except minors are citizens," "All the planets except Venus and Mercury are beyond the Earth's orbit." Such propositions appear to be universal and simple at the same time. But they really consist of two propositions, which may be either both of them universal, or both particular, or one of them universal and the other particular. Thus, "All but minors are citizens" may be resolved into "All persons over twenty-one years of age are citizens," and "All under twenty-one years of age are not citizens," or into "Some men are citizens" and "Some men are not citizens," or again into "All minors are not citizens," and "Some persons are citizens." The first two forms of reduction, however, are preferable as representing a better form of comparison. The class of exceptive propositions is not so important for logic as the partitive and exclusive, because their influence upon fallacies in reasoning is not so great.

The following tabular résumé represents the divisions of propositions and the form to which the equivocal forms have to be reduced in order to be amenable to the rules of logic :



In order to satisfy the formal laws of logic, the whole class of equivocal propositions has to be reduced to univocal judgments.

III. **DISTRIBUTION OF TERMS.**—What is called the distribution of terms in propositions has much importance in determining the legitimacy, or at least the intelligibility of our reasoning and the assurance that it will be accepted by others. A better expression would probably be the *quantification* of terms, but "distribution" is the term employed by logicians and it will be safer to abide by usage. Terms are said to be *distributed* or *undistributed* according as the whole or only a part of the extension of a concept is taken into account in the assertion. A distributed term is one in which something is said about a definite whole or about the totality of a definite class. An undistributed term is one in which something is said only about an indefinite part of a whole or class. Another way to state it is to say that distributed term is one in which the conception is *definitely quantified*, and an undistributed term is one in which the conception is *indefinitely*

quantified. Now to apply these definitions to the several propositions, A, E, I, and O.

Thus in proposition A, "All men are bipeds," the subject is said to be distributed because the assertion is definitely about the whole of a class, or about a definite whole. But the predicate in the same proposition is said to be undistributed, because nothing is asserted definitely about the whole of it or its extension. The proposition does not affirm that "All men are *all* the bipeds," but leaves it free to suppose that there may be other things included in the class besides "men." Nothing is either said or implied to this effect, and hence, in so far as this particular assertion is concerned, nothing is known about the question whether the quantity of the predicate is greater or equal to that of the subject, so that the quantity is wholly indefinite, though certainly equal to that of the subject, but indeterminate beyond this. Fig. IV. will represent graphically this relation,

FIG. IV.

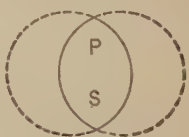


FIG. V.

quantitatively expressed, between subject and predicate, the former being distributed and the latter undistributed. In proposition I, for example, "Some men are negroes," the subject is not distributed, because it is indefinitely quanti-

fied, or because nothing is said about the whole class "men." The predicate is undistributed in this case for the same reason that it is in the A proposition. The relation here between subject and predicate is expressed by Figure V. In propositions E and O the quantification of the subjects is determined by the same rules as in A and I, and is equally apparent.

But the quantification of the predicate in E and A is not so easy to make clear in language. No term is employed to indicate explicitly whether the whole of the predicate is taken into account, and we are left either to diagrams to represent the meaning or to the evident import of the term "*not*" and its indication of exclusion. Perhaps we could even treat this term as the quantifying one in the case. But in both E and O the predicate is said to be distributed, and this because the propositions mean to assert that the whole of the predicate is excluded from the subject. The relation between subject and predicate in proposition E may be diagrammatically represented by Figure VI., and in proposition O by Figure VII.

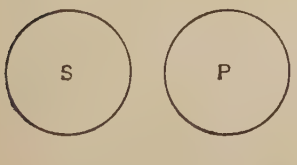


FIG. VI.

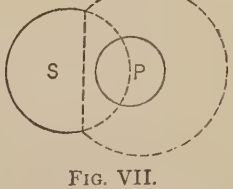


FIG. VII.

There is another way of representing this relation in a form for testing the validity of the syllo-

gism in formal reasoning. If we represent the subject of a proposition by S, the predicate by P, the affirmative by the sign of equality, the negative by a cross, the distribution of a term by a circle around it, and the non-distribution by the absence of the circle, we can have the relations indicated as follows: A propositions will be represented by $\textcircled{S} = P$; E propositions by $\textcircled{S} \times \textcircled{P}$; I propositions by $S = P$, and O propositions by $S \times \textcircled{P}$.

The rules for this quantification may be formulated as follows, two forms of statement being given for convenience:

				Subject.	*Predicate.*
Propositions	Universal	Affirmative,	A	Distributed,	Undistributed.
		Negative,	E	Distributed,	Distributed.
	Particular	Affirmative,	I	Undistributed,	Undistributed.
		Negative,	O	Undistributed,	Distributed.

All *Universal* propositions, A and E, distribute the *subject.*

All *Particular* propositions, I and O do not distribute the *subject.*

All *Affirmative* propositions, A and I, do not distribute the *predicate.*

All *Negative* propositions, E and O, distribute the *predicate.*

There are two propositions of a peculiar character which require special mention in this connection. They are *Definitions* and *Exclusive* propositions. In the former the predicate quantitatively coincides with the subject; that is, is treated as identical with it. In this way it appears to be distributed, although it seems to be a universal af-

firmative. But *formally* it is not so distributed. We only know this equivalence between subject and predicate by first knowing that the proposition *is* a definition. The form of expression does not indicate it invariably or infallibly, and hence *formally* definitions have to be treated as A propositions. When the predicate is considered as distributed in them, it is only from a knowledge of its *material* meaning, and not from the mode of expression, which is all that formal logic can recognize.

In exclusive propositions of the form "Only elements are metals," or "Only the honest deserve respect," though *apparently* A propositions, the subject is undistributed and the predicate is distributed. This is the meaning of the term "only." In the case "Only elements are metals," we do not say or imply that "*All* elements are metals," though this *might* be true. But we mean that "nothing else" can be "metals," or that "all non-elements are not metals," which is the same in meaning as "All metals are elements," in which "metals" is distributed, and hence distributed in the exclusive proposition.

In this elementary treatise I shall say nothing about the doctrine of the explicit quantification of the predicate as advocated by some writers, farther than to say that it adds four new propositions to our classification. These are U and Y, affirmative corresponding to A and I, and η and ω (Greek letters), negative, corresponding to E and O. In U and Y the predicate is said to be distributed, as in the propositions "All the Cau-

casians are all the whites," and "Some elements are all the metals." In η and ω the predicate is said not to be distributed, as "No men are some animals," and "Some metals are not some elements." Such forms of expression are not frequent enough in practical discourse to treat them as important.

CHAPTER VI

OPPOSITION

I. MEANING OF OPPOSITION.—Opposition treats of the relation between the propositions A, E, I, and O, growing out of their quantity and quality. It has not to do with the relation between the subject and predicate, nor with the elements of propositions as such, but with the propositions as a whole. The question regarding their consistency and inconsistency with each other is the proper one to be considered in thus fixing their relations, and hence the conditions under which the truth or falsity of any one or more propositions can be maintained when other propositions are asserted. But Opposition does not undertake to decide what propositions are necessarily true to start with, but only what will follow in three of them if the fourth is supposed to be either true, false, or indeterminate. Some propositions, if true, interfere with the truth of others, or may also include the truth of still others, and the falsity of some propositions likewise interfere with the falsity of others, or may include the falsity of still others. All four propositions, assuming, of course, that they contain the same matter, cannot be either true or false at the same time. Hence the problem of

opposition is to determine the conditions and limitations under which any one or more of these propositions can be affirmed or denied when certain others are affirmed or denied.

We have said that, in order to determine the relations of agreement or disagreement between these propositions, they must have the same matter. This means that the subject and predicate of any given proposition must either be the same as those of any others compared with it, or must be capable of comparison with such subject and predicate through the relation of genus or species. Thus we cannot determine any relation of consistency or inconsistency between such propositions as "Iron is hard" and "Water freezes," or even such as "Iron is hard" and "Iron is useful." We must have, for the purposes of the purest formal logic, such propositions as "All metals are elements," "No metals are elements," "Some metals are elements," and "Some metals are not elements." In these alone can we ascertain, in the simplest way, the formal rules for the relation of consistency and inconsistency, between propositions.

The place which Opposition occupies in argumentative discourse is this: It determines the manner in which we may most effectively prove or disprove certain propositions, and hence the conditions under which clear thinking and debating are to be conducted. To this we shall return after exhibiting the laws of Opposition.

II. **LAWS OF OPPOSITION.** — The relations of consistency and inconsistency between propo-

sitions can first be illustrated and the laws for those relations formulated afterward. Thus if we assert that "All horses are animals," it cannot be true at the same time that "No horses are animals," or that "Some horses are not animals." This we express by saying that if A be true, E and O cannot be true at the same time. They are both *inconsistent* with it. Also again, if it be true that "No men are quadrupeds," it cannot be true that "All men are quadrupeds," or that "Some men are quadrupeds." This we again express by saying that if E be true, A and I cannot be true at the same time, but are inconsistent with it. But still farther, if it be false that "All men are Caucasians," it will be true that "Some men are not Caucasians," but nothing is determined, one way or the other, about the proposition "No men are Caucasians." This last may be true as a matter of fact, but this truth does not follow from the falsity of the first. Hence, to express the same matter more formally, if A be false, it follows that O must be true, but it does not follow that E is either true or false. It is indeterminate so far as A is concerned, no matter whether it be true or false as a fact. On the other hand again, if it be false that "Some men are not mortal," it must follow that "All men are mortal," and, as we have shown previously, the negative of this, "No men are mortal," will be false. This we express by saying that if O be false, A will be true and E is false. Similarly, if I be false, E must be true and A false. In this way we find that if A be true, O will be false, and if A be false, O will be true; and if E be true, I will be false, and if E be false, I will

be true; again, if O be true, A will be false, and if O be false, A will be true; and if I be true, E will be false, and if I be false, E will be true. This kind of inconsistency between A and O, on the one hand, and between E and I on the other, we call *contradiction*. In the loose sense of the terms, the words "contradiction" and "contradictory" are used to express any kind of inconsistency which prevents two things from being true at the same time. But as the relation between A and E is not the same as between A and O or E and I, a technical meaning has to be given to the term "contradiction" and another term employed to express the relation between A and E. In the *Contradictories* A and O, and E and I there is a *mutual* or reciprocal and universal inconsistency which enables us to say that one or the other must be either true or false, or that only one of them can be true or false at the same time. But A and E are called *Contraries*, because, although the truth of A implies the falsity of E, and *vice versa*, the truth of E implies the falsity of A, yet the falsity of either of them does not imply the truth of the other, but the falsity of either leaves the other wholly indeterminate.

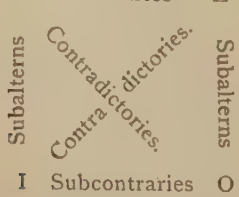
It remains to determine the relations between A and I, E and O, and I and O. First, if it be true that "All men are mortal," it will be also true that "Some men are mortal;" if it be true that "No men are quadrupeds," it will also be true that "Some men are not quadrupeds." This we express by saying that if A be true, I must be true, and if E be true, O must be true, because the

part must be included in the whole. But on the other hand, if it be true that "Some men are wise," it does not follow that "All men are wise;" or if it be true that "Some men are not wise," it does not follow that "No men are wise." This we express by saying that if I be true, A will be *indeterminate*, and if O be true, E will be *indeterminate*. This is because the whole is not included in the part. But again, if we suppose a proposition A to be false, it will be found that I will be indeterminate, and the same with O if E be false. On the other hand, if I be false, it does not leave A indeterminate, nor will the falsity of O leave E indeterminate. On the contrary, the falsity of I implies the falsity of A, and the falsity of O that of E. This variable relation is expressed by calling A and I, and E and O, *Subalterns*. But A in relation to I, and E in relation to O are each called *Subalternans*, while I and O are called *Subalternates*.

When we compare I and O we find that they are of the opposite quality and the same quantity. One is affirmative and the other negative, and in that respect they are "opposed" to each other. But the relation of consistency and inconsistency between them is the reverse of that between A and E. We found that A and E could not both be true, but they might both be false at the same time. In the case of I and O compared, if it be true that "Some metals are elements," the law of Contradiction between E and I will make E, "No metals are elements," false, and by subalternation, as just explained, O will be indeterminate. That

is, nothing follows about O from the truth of I, and also nothing about I from the truth of O. But if it be false that "Some men are trees," it follows by contradiction that the proposition "No men are trees" is true, and by subalternation, "Some men are not trees" would be true also. This we express by saying, that if I be false, E will be true, and by inclusion O will be true, and by parity of reasoning if O be false, I will be true. But both cannot be false at the same time, because this would involve the simultaneous truth of A and E, but they, I and O, may both be true. This relation is expressed by calling them *Subcontraries.*

These various relations of the four propositions can be diagrammatically represented by what is called the Square of Opposition.



The rules for regulating or expressing these relations can be formulated as follows:

1. Of *Contradictories*, one must be true and the other false.

2. Of *Contraries*, only one can be true and both may be false.

3. Of *Subcontraries*, only one can be false and both may be true.

4. Of *Subalterns*, if the subalternans be true, the subalternate will be true, but if the subalternans be false, the subalternate will be indeterminate. On the other hand, if the subalternate be true, the subalternans will be indeterminate, but if the subalternate be false, the subalternans will be false.

III. **SPECIAL CASES.**—The rules of Opposition are laid down for *Universal* and *Particular* propositions, as introduced respectively by *All* and *Some*, or their equivalents. But they have to be modified for *Singular* propositions and for a class which may be called *abstract* general propositions, and which may be treated as Singulars. Singular propositions will have no Contraries and no Subcontraries. They can have only Contradictories. Thus, "Socrates was a man" has only the Contradictory "Socrates was not a man." The form "Some Socrates," or "Some of Socrates was a man," is palpably impossible and nonsense, and anything more universal than itself with the same subject is equally impossible. That it can only have a Contradictory and neither Contrary nor Subcontrary is evident from the attempt to apply the rules of Opposition to it. If the affirmative be true, the negative will be false; if the affirmative be false, the negative will be true; and *vice versa*. This expresses the relation of Contradiction.

What I have called *abstract* general propositions is illustrated by such as "Charity is a virtue," "Science is useful," "Religion is true." Considered as abstract terms, the subjects in these cases may be treated practically as Singulars. Hence

the rules for the Opposition of Singular propositions may also be applied to them.

The importance of these considerations will be observed at once if we remark that in almost all ordinary discourse and argument we are dealing either with concrete Singular propositions or Abstract general ones. The recognition of this fact will simplify the methods of treating discourse. We should have only to consider the simple relation of contradiction in the process of argument.

IV. **PRACTICAL APPLICATION OF OPPOSITION.**—The practical use of Opposition consists in its showing how proof and refutation can be best accomplished. If an opponent asserts an A proposition, the proper and easier way to refute him is to prove O. If O be true, A cannot be true. A could be equally disproved by the truth of E, but it is always harder to prove a Universal than a Particular or a Singular. Any person who asserts a universal proposition, either A or E, lays himself under the obligation to explain away or disprove every single exception brought against it. An opponent may thus always restrict himself to the much easier task of finding instances which contradict the universality of the statement against him, but if he takes upon himself to affirm the Contrary instead of the Contradictory, he lays himself open to attack. "Were it to be asserted, for instance, that 'All Christians are more moral than Pagans,' it would be easy to adduce some examples showing that 'Some Christians are not more moral than Pagans,' but it would be absurd

to suppose that it would be necessary to go to the contrary extreme, and show that 'No Christians are more moral than Pagans.'" The error in disproof, however, may lie in certain assumptions about the relations between the two propositions after the proper one has been proved. Thus I may be required to disprove the proposition "All Indians are moral," and in order to do so I may maintain, or prove, that "Indians are not civilized." But here I simply evade the issue. My proposition neither contradicts the one to be disproved nor is the contrary of it. Again, it is no disproof of the assertion that "Cromwell was a usurper," to say that "Foreign nations acknowledged his authority," any more than it would be proof of his legitimacy to make the same statement. Likewise it is no disproof of the assertion "A is bad" to say that "He is religious," any more than it would prove that a man is white by showing that he is not black. If I assert that "Governments are necessary," it is no disproof of it to show that "Some governments are bad." Many arguments in refutation, however, are conducted upon just such logic, assuming an inconsistency where there is none. But to be pertinent and effective, an argument in refutation must really contradict, and the most secure resource for this contradiction is the assertion of a Particular against a Universal proposition. But the proof of a Particular against a Particular proposition will not refute, because, as we have seen in the Square of Opposition, both I and O may be true at the same time. The disproof in this case necessitates an appeal to a Uni-

versal proposition whatever the disadvantages in this procedure.

In the process of proof as distinct from refutation, there is no escape from the obligation to use Universals, no matter whether the proposition asserted be a Particular or a Universal. The proof of the Particular must involve some Universal or Subalternans which includes it, and the proof of a Universal involves some proposition more general and inclusive of the one to be established. This necessity of resorting to Universals for proof is the fact that makes proof more difficult than refutation, which, as we have seen, does not require to go further than the use of Particular propositions, save in the case of refuting a Particular. But there is an alternative here which considerably lightens the task of the debater when called upon to argue against Particular propositions. This is the demand for proof of them, especially when we know, what will be learned in discussing the syllogism, that Particular propositions can serve no purpose for further reasoning of any important kind, and hence are serviceable only for disproof.

CHAPTER VII

IMMEDIATE INFERENCE

I. **DEFINITION.**—The term inference in general expresses a very comprehensive process that is difficult to define, because it equally includes the reasoning to what is possible with what is certain and necessary. But it is at least the act of mind which undertakes to connect or to see new or old ideas upon the basis of those already known, and takes several forms, the two main ones going by the name of Deductive and Inductive inference. When it comes to considering immediate inference, however, the definition is less comprehensive and, therefore, much easier. (Immediate inference is simply the deduction of one proposition from another implying it.) The process is usually defined as *reasoning without a middle term.* This means that only one proposition is required for the premise, and that the conclusion is drawn directly from this one and without comparison with any other term or proposition. Thus from the proposition, "The sciences are useful," I can infer, if "infer" is the right term here, that "Some useful things are science," or, "What is not useful is not science." The process may be nothing but a restatement of the original meaning

in a new form or relation, but it nevertheless has its use in understanding the various forms of thought which the mind adopts in its transition from one form of expression to another, and hence correct immediate inference serves as a criterion of the legitimate mode of passing from one proposition to another without introducing new matter.

II. **DIVISIONS.**—The divisions of Immediate Inference are based upon the various forms in which it is possible to state directly the meaning and implications of a proposition without introducing new thought or ideas. These forms may be called, in terms of general usage in logic, *Conversion*, *Obversion*, *Contraversion* (Contraposition), *Inversion*, *Contribution*, and *Antithesis*. Each of these requires separate treatment.

1st. **Conversion.**—Conversion is the transposition of subject and predicate, or the process of immediate inference by which we can infer from a given proposition another having the predicate of the original for its subject and the subject of the original for its predicate. But there are certain limitations under which this transposition can take place. For instance, from the proposition, "All horses are animals," we cannot infer that "All animals are horses;" nor that "Some animals are not horses," though this may actually be a fact. The rules, therefore, which limit the process of conversion are two:

(a) The quality of the converse must be the same as that of the convertend.

(b) No term must be distributed in the converse which is not distributed in the convertend.

These rules may be abbreviated so as to read: *Do not change the quality of a proposition*, and *Do not distribute an undistributed term.* We may undistribute a distributed term, but not *vice versa.* The *Convertend* is the proposition to be converted; the *Converse* is the proposition or result after the process of conversion has been performed.

The forms of conversion are two, according as the *quantity* of the Converse is the same or different from that of the Convertend. If the quantity of the converse remains the same as that of the convertend, the conversion is called *Conversio simplex*, or Simple Conversion; if the quantity is changed (diminished), it is called *Conversio per accidens*, or Limited Conversion, usually Conversion by Limitation. We have now to illustrate the process and to ascertain the extent of its application to the several propositions, A, E, I, and O.

1. *Proposition A.*—Take the proposition, "All apples are fruit." In this proposition, as already shown, the predicate is not distributed. This means that other things also may be contained in the predicate, or class "fruit," so far as can be determined by the assertion given. It is, of course, not known from the assertion itself that any additional matter is included in the predicate, but only that the form of expression does not exclude this possibility. Hence, if in transposing the subject and predicate, we say "All fruits are apples," we should be asserting more than the original proposition will admit. In the original we have said nothing about the whole of the term "fruit," whether it includes or excludes

other subjects, but only that it includes "apples;" and so we cannot be permitted to infer anything not distinctly said or implied by our premise. Consequently, we can assert something only of a part of this predicate in the process of conversion, if we assert anything at all, inasmuch as the original asserts something only of a part of the predicate and asserts or implies nothing about the rest of it. That we may assert something is evident from the fact that some degree of identity or connection exists between the subject and predicate in the convertend, and this same relation can be asserted or inferred in the converse. By limiting our statement, therefore, to the part of the predicate of which we actually affirm something, we are able to infer from the original proposition that "Some fruits are apples." This is evidently legitimate, and as evidently true if the original be true. Here the quantity of the proposition is changed, while its quality remains the same; that is, the quantity of the *convertend* is universal and its quality affirmative, while the quantity of the *converse* is particular and the quality affirmative. We have, therefore, converted A into I. To convert "All apples are fruit" into "All fruits are apples," would be to violate the second rule for conversion. Hence A cannot be converted into A. To change the quality of the proposition A in conversion—that is, into either E or O—would be to violate the first rule for conversion. It is apparent that we cannot infer an exclusion between a subject and predicate from an affirmed connection or identity between them. Hence A

cannot be converted into either E or O, and we have found also that it cannot be converted into A, *but only into I*. This fact is expressed by saying that A is not capable of *simple*, but only of *limited*, conversion.

There is at least one apparent exception to this rule, and perhaps two. This is the case of *definitions* and *exclusive* propositions. Definitions are often considered, at least tacitly, as universal affirmatives, and yet they are capable of *simple* conversion. The truth is, however, that definitions are not A propositions in their meaning, but only in their *form* of statement. They are *materially* U propositions and capable of simple conversion on that account, but *formally* we can only apply limited conversion to them. We must know from some other fact than their form of statement that they are definitions in which the predicate is made convertible or identical with the subject. But without assuming this material identity we could know nothing of the virtual distribution of the predicate, and hence formally definitions have to be treated as all propositions in A, until we are told or made to know the intention of the person using them. Formally considered, therefore, they can no more be converted than ordinary propositions into A. Nevertheless, it is important to observe that in some cases of our actual reasoning the mind may be correct in its processes on the ground that the datum is a definition—that is, subject and predicate are identical or convertible, although *formally;* that is, in its external appearances, the reasoning is fallacious. It would simply

be a case where the *real* meaning is different from the formal and apparent meaning of the proposition.

The exclusive proposition, although it may appear to some people as a universal, is not such. The subject is not distributed, though the predicate is. The "*only*" means *some, and it may or may not be all, but certainly nothing else.* Hence the exclusive proposition is, from its distribution of the predicate and not that of the subject, in fact but an *inverted universal*, so that its simple conversion is but its reduction to an univocal proposition.

2. *Proposition I.*—The proposition "Some men are vertebrates" can only be converted into "Some vertebrates are men," or by simple conversion. We cannot infer from it that "All vertebrates are men," for the same reason that we cannot convert A into A. It is because the predicate in the convertend is undistributed, and must not be distributed as subject in the converse. It would seem to be an exception to this that from "Some men are Caucasians" we may be supposed to infer correctly that "All Caucasians are men." But while this converse may be true, we must not suppose that because any proposition is true we can infer it from anything else. We simply happen to know that "All Caucasians are men," and this fact is not *formally* expressed or implied in the proposition "Some men are Caucasians;" and as we are only dealing with formally definite or indefinite assertions, we are not allowed to transgress our rules simply because we may happen to know that any

given proposition is true. We must distinguish between what we can *believe* and what we may *infer*. Further again, it would violate the first rule to convert I into E or O, for the same reason that A cannot be converted into E or O. Hence *I can only be converted into I.* This is a case of *Conversio simplex*, or Simple Conversion, because the quantity and quality, or form, of the converse is the same as that of the convertend.

3. *Proposition E.*—The proposition "No books are pens" can be converted either simply or by limitation. In this E proposition the predicate is distributed, and this fact will permit of the distribution of the same term in the converse. Hence we can infer or assert "No pens are books." By subalternation from this we can infer "Some pens are not books." The first of the two cases is the *simple* converse, and the second the *limited* converse of the original, and can be directly obtained by remembering that a distributed term can be undistributed, but not *vice versa*. Hence E is convertible into either E or O. But O may be called a *weakened* converse of E, because E might as well be inferred.

4. *Proposition O.*—A peculiar difficulty exists in particular negative propositions, as will be apparent in the attempt to convert the proposition "Some men are not Caucasians," which is true, into "Some Caucasians are not men," which is not true. Of course it is not the truth or falsity of the converse that determines whether the conversion is correct or not, but we may safely use a contradiction between convertend and converse

as evidence of mistake somewhere. But the reason for the error is to be found in the nature of the original assertion. First, we have found that the converse must be of the same quality as the convertend. In this case, therefore, the converse must be negative. But according to the rule, negative propositions distribute the predicate. Hence the subject of the convertend which is not distributed becomes the predicate of the converse which is distributed, and so violates the second rule. Therefore O cannot be converted by the ordinary method, if at all.

It has been usual, however, to apply what is called an indirect method called *Conversion by Negation.* Take, for example, "Some realities are not material objects." If we infer that "Some or all material objects are not realities," we violate the second rule, because the predicate of the converse is distributed, while the subject of the convertend, which becomes the predicate of the converse, is not distributed. But now if we attach the negative term "not" to the predicate in the original we have "Some realities are not-material, or non-material objects;" or again, the equivalent, "Some realities are immaterial objects." The proposition thus resulting is supposed to be identical with the first and original instance. But we observe that it becomes I in this form which we can convert simply into "Some immaterial objects are realities," or in the less euphonious form, "Some not-material objects are realities." This proposition, then, can be inferred from the original, and the process of reaching it has been called

the indirect one of Negation. The same process is applicable to any similar propositions. Thus the instance of "Some elements are not metals" would become, first, "Some elements are not-metals, or non-metals," and then "Some non-metals are elements," etc.

But it must be observed that the quality of this so-called converse is affirmative, while that of the convertend is negative, and hence viewed in this light the process of conversion by negation is a violation of the first rule. Besides, we have been led by it to affirm something positive about non-material or immaterial objects assumed in the converse, when the convertend merely denies something about *material* objects. While this may be allowable by some other process, it is not permissible by conversion. The violation of the first rule decides that matter. Hence we conclude that proposition O is really not convertible at all, because the retention of the quality violates the second rule, and the alteration of the quality violates the first rule. This is now the general opinion of logicians. Nevertheless, the process described as conversion by negation is a legitimate one, at least formally speaking. But it is in reality a double process: first one of obversion and then one of conversion, which makes the result the converse of the obverse of the original. This makes it what we shall call Contraversion, or the process commonly called Contraposition.

2d. **Obversion.**—Obversion is sometimes called "Immediate Inference by Privative Conception." This will serve as a good name when the proposi-

tions are affirmative, and when a privative term can be found for the purpose. But when the proposition is negative, and when a privative term is not accessible, it is much better to use the term *Obversion.* The process consists in *negating the copula and the predicate without converting*. Thus the proposition "All men are mortal" is obverted by saying, "All men are not not-mortal," or "No men are not-mortal," or again, as it is sometimes expressed, "No men are immortal." Here it is noticeable that Obversion *changes the quality* of the proposition in the process from affirmative to negative, or from negative to affirmative, as the case may be. The meaning of the original is retained by virtue of the fact that the two negatives make an affirmative, but the form of expression appears as negative, since one of the negatives qualifies the copula and the other the predicate.

In the negative proposition the obversion is accomplished simply by connecting the negative particle with the predicate, which both changes the quality of the proposition and the character of the predicate, as in the affirmative. Thus, "No men are quadrupeds," or "All men are not quadrupeds," by obversion becomes "All men are not-quadrupeds," meaning that they are in the class "non-quadrupeds" from not being in the class "quadrupeds." This process terminates in the same result as literally following the rule. To follow the rule of double negation in this case the proposition would become "All men are not not-quadrupeds," and the first two negatives becoming superfluous, cancel each other; so that we

have, as in the first case, "All men are not-quadrupeds." A negative proposition is, therefore, most conveniently obverted by transferring the negative particle to the predicate. In regard to the process in general it will be found, by following the rule, to apply to all four propositions—A, E, I, and O.

3d. **Contraversion or Contraposition.**—Contraversion or Contraposition consists in *the negation of copula and predicate with conversion.* That is, we first obvert the original and then convert this obverse. It amounts to the same thing to take the negative of the predicate in the contravertend for the subject of the contraverse, and deny the connection between it and the subject of the contravertend, if the latter be affirmative, and affirm the connection if the contravertend be negative. This can be best explained by an example. Take the proposition "All men are mortal." By the very terms of this judgment the class "men" is wholly included in the class "mortal," as indicated in Fig. IV., and excluded, therefore, from everything "not-mortal." We can, therefore, affirm that "All men are not in the class of those who are not mortal;" or, more briefly the obverse, "All men are not not-mortal." By simple conversion from this we get "All not-mortal are not men." But, again, noticing that the inclusion of "men" in the class "mortal" excludes those who are "not-mortal" from "men," we may as well affirm that fact directly, and hence from the original infer at once from "All men are mortal" that "All not mortals are not men." We reach the result in this case without a roundabout process.

The same process will apply to propositions in E. Simply include the negative particle in the subject of the contraverse and make the latter affirmative. Thus, "All negroes are not Caucasians" will be contraverted by saying "Some not-Caucasians are negroes." The transfer of the negative particle to the term to be used for the subject of the contravertend has the effect of obversion, and makes the proposition an A, which must be converted by limitation into I.

By similar processes we can treat I and O. But we shall find that I cannot be contraverted, for the same reason that O cannot be converted. Summarizing results, however, we find that all propositions except O can be converted; all can be obverted, and all except I contraverted.

In the practical application of Contraversion we must be careful about the use of privative, and especially nego-positive, terms. The result to the latter in particular, in substitution for the negation of the predicate, may lead to equivocation, and therefore to material error in the process. Thus to contravert "All just acts are expedient" into "All inexpedient acts are unjust," is to assume that "unjust" is convertible with "not-just," which is not necessarily the case. A better illustration of the contention here made is perhaps the proposition "All human actions are free," in which the contraverse is "All not-free actions are not human," instead of "All not-free actions are *inhuman*." Other cases of a like error may not be so evident, but they are precisely the kind of error against which we have to guard.

4th. **Inversion.**—Inversion is the process of inferring from one proposition another which shall contain for its subject the negative of the subject in the original, and for its predicate the predicate of the original. The result is accomplished by alternating the processes of obversion and conversion, and beginning with either of them and proceeding until the result is gained. A and E can be inverted; I and O cannot. In the case of the two propositions the result depends upon the way we begin. Take an A proposition: "All horses are animals." If we start with conversion, then obvert, and again try to convert, we shall find that we have an O proposition for the last process and we can proceed no farther. But if we first obvert, then convert, obvert again, then convert, and lastly obvert, we shall find the required proposition. Thus, "All horses are animals" obverted is "All horses are not not-animals;" then this converted gives "All not-animals are not horses;" obverted again we have "All not-animals are not-horses," and again converted, being an A proposition, becomes "Some not-horses are not-animals," and lastly obverting, we have "Some not-horses are not animals." The process, however, is not important in practical logic and does not require to be more than mentioned.

5th. **Contribution.**—Contribution is the process by which *what is affixed to the subject as a modifier may also be affixed to the predicate in the same sense.* It takes two forms, called respectively *Immediate Inference by Added Determinants*, and *Immediate Inference by Complex Conceptions.* The simplest

illustration of the general process is in mathematics. Thus if $x = a$, then $x + 1 = a + 1$.

1. *Inference by Added Determinants.*—This consists in merely adding some adjective or similar term to both subject and predicate. Thus, to "A house is a dwelling" we can add "A good house is a good dwelling." But we cannot add different quantities to both terms, as is implied by using the superlative degree of an adjective. Thus, while we can say "Dogs are quadrupeds," we cannot say "The largest dogs are the largest quadrupeds." The quantity and quality added must be the same. This will not always apply to particular proportions.

2. *Inference by Complex Conception.*—This consists in the addition of complex phrases and clauses to both sides of the proposition, always observing the identity of quantity and quality in both cases. Thus, to "Pigeons are birds" we can add "Pigeons that live in warm climates are birds that live in warm climates," etc. But here we have to be on our guard against the same error as in Added Determinants. From "Voters are men" we cannot infer that "The majority of voters is the majority of men."

False inferences by contribution often occur, even though it be unintentional, in long and complicated cases of discourse, and it requires close observation to detect them. In simple reasoning they are not so liable to take place.

6th. **Antithesis.**—(Antithesis is *the inference from any given proposition to a complementary opposite*.) It is not valid in any proposition except *materially* in

definitions, and in *duplex* propositions. But it is a very common error to make the inference. Thus, if we make the assertion that "All good men are wise," many people think themselves entitled to infer that "All bad men are not wise." If goodness and wisdom are identical, the inference is correct, because the proposition would practically be a definition. But we know nothing about such identity from the proposition. The process assumes the distribution of the predicate when this is not the case. We must, however, be on our guard also not to confuse the mere statement of an antithesis with the inference to it. Thus the Book of Proverbs often states antitheses, which we are not obliged to interpret as inferences from one of the propositions.

CHAPTER VIII

MEDIATE REASONING

I. **DEFINITION.**—Mediate inference is *reasoning by means of a middle term.* A Middle term is one which is compared with two others, called Minor and Major terms, and on the ground of which a connection or relation, affirmative or negative, can be established between these two in the conclusion. This use of a middle term makes it necessary that there should be more than a single premise in order to effect a conclusion. An illustration of this form of reasoning is found in the following :

All machines are instruments for applying power.
All locomotives are machines.
∴ All locomotives are instruments for applying power.

In this process we are supposed to see or discover the connection between subject and preidcate in the conclusion because of their connection with the middle term, "machines," in the premises. The reasoning in such cases is usually called the *Syllogism*, or *Syllogistic Reasoning*.

II. **DIVISIONS.**—There are two kinds of syllogistic or mediate reasoning, according as the conclusion is or is not included in the premises. These are usually called *Deductive* and *Inductive*

Reasoning. Deductive reasoning is of that kind which aims to *deduce* the conclusion; that is, to draw it out of the premises by virtue of its supposed *necessary* inclusion in them. Inductive reasoning is of that kind which aims to *induce* the conclusion; that is, to suppose a new idea or proposition as a *probable* truth from known facts. In deductive reasoning the premises make the conclusion *necessary*, supposing that the formal rules of the syllogism have been observed; in inductive reasoning the conclusion is at most only *possible* or *probable*. In both of them there are two directions, so to speak, in which the reasoning may occur. We may start with the premises and discover the conclusion. This may be technically called *inference*. Or we might start with the assertion of a proposition and seek to discover the grounds upon which it rests; namely, the premises. This may be technically called *proof*. The former is a *progressive*, and the latter a *regressive*, process. In the one we discover a conclusion from foregone premises, and in the other we discover the premises for a foregone conclusion.

III. **ELEMENTS OF THE SYLLOGISM.**— Every syllogism must have three propositions and three terms, and only three of each. This is the simple rule for the syllogism. The three terms are called the *Major*, the *Minor*, and the *Middle* terms. Of the three propositions, two are called the *Premises*, and one the *Conclusion*. Of the premises, one is called the *Major* and the other the *Minor*. The Major term is the *predicate* of the conclusion, and the Minor term the *subject* of the

conclusion. The Middle term is found only in the *premises*, and may be either the subject or the predicate in either of the premises, but must always be found once in both premises. The Major Premise contains the Major and Middle Terms: the Minor Premise, the Minor and Middle terms; and the Conclusion, the Minor and Major terms. Without the express statement of the conclusion there is no rule for determining, in the actual reasoning of practical life, which of the premises is the major and which the minor. We are at liberty to choose either of them as a major or minor, and to try the consequences by the rules of the syllogism. But for the sake of a uniform rule which shall express the most convenient form in which reasoning ought to be conducted in order to avoid obscurity, logicians have agreed to the law that properly the major premise shall stand first, the minor premise second, and the conclusion last. This enables formal discourse and reasoning to be conducted without misunderstanding as to order and definiteness. But in common discourse this rule is not always followed. In this the minor premise may come first, and the major premise second; or the conclusion may come first, as often in the case of *proof*, and the premises in any order we please after that. But formal regularity or uniformity of procedure would require us to adopt some rule of correct order in which the inclusion of terms is most easily perceived. The order is, the major premise first, minor premise next, and the conclusion last.

It has been usual to employ symbols for the

several terms of the syllogism in order to illustrate more easily the various relations of terms and propositions in the forms of reasoning. The letters chosen for this purpose are S, M, and P, with an additional implication in the use of S and P, as compared with their previous employment. S shall stand for the *minor term*, which is always the *subject of the conclusion*, and P for the *major term*, which is always the *predicate of the conclusion*. They thus stand respectively for the subject and predicate, as heretofore, *but only in the conclusion*, since the minor term, S, is not always the subject in the premise, nor the major term, P, always the predicate in the premise. M shall stand for the *middle term*, and may be either subject or predicate in either or both of the premises. The combination of these terms will represent the premises and conclusion.

Terms.

M = Middle Term.
S = Minor Term = Subject of Conclusion.
P = Major Term = Predicate of Conclusion.

Propositions.

M is P = Major Premise.
S is M = Minor Premise.
S is P = Conclusion.

IV. **RULES FOR THE SYLLOGISM.**—The rules for the construction of the syllogism may be divided into two classes. First, those affecting

the subject-matter of the propositions and the syllogism as a whole. Second, those affecting the quantity and quality of the propositions. We do not investigate here how these rules came to be adopted, as the reasons for them would take us farther than an elementary treatise will allow. Hence we simply state the results with the purpose of using the rules to test the valid and invalid forms of reasoning.

1st. **Rules Affecting the Subject-Matter of the Syllogism.**

1. Every syllogism must have three terms, and only three terms.

2. Every syllogism must have three propositions, and only three propositions.

3. No term in the premises of the syllogism should be ambiguous.

An ambiguous term is equivalent to the use of *four* terms in the syllogism. Although it conforms in appearance to the rule, its double meaning makes it include the fourth term.

2d. **Rules Affecting the Quantity and Quality of Propositions.**

4. The middle term must be distributed at least once in the premises.

5. No term must be distributed in the conclusion which was not distributed in the premises.

6. No conclusion can be drawn when both premises are negative.

7. No conclusion can be drawn when both premises are particular.

8. No universal conclusion can be drawn when one of the premises is particular ; or if one of the

premises be particular, the conclusion must be particular.

9. No affirmative conclusion can be drawn when one of the premises is negative; or if one of the premises be negative the conclusion must be negative.

In the construction of every syllogism we must have reference to two things: first, the quantity and quality of the propositions, and second, the position of the middle term. These conditions give rise to what are called the *Moods* and the *Figures* of the syllogism.

V. **MOODS OF THE SYLLOGISM.**—The Mood of a syllogism is that characteristic of it which is determined by the *quantity and quality* of its propositions. The Mood can never be separated from the Figure in practical reasoning, but it is not determined by the same characteristics. Every syllogism, as we have seen, must contain three propositions and only three. But there are four forms of propositions (eight in case of quantifying the predicate) to be considered, from which three have to be chosen and combined in various ways. Thus all three propositions, major premise, minor premise, and conclusion may be A propositions, or one an A or I proposition, one E and the other an E or O, etc. With the four propositions, therefore, the conceivable Moods will represent all possible combinations, either of the same or different quantity and quality. When the combinations are completed we find them to be *sixty-four* in number. They appear in the following table:

AAA	AEA	AIA	AOA	EAA	EEA	EIA	EOA
AAE	AEE	AIE	AOE	EAE	EEE	EIE	EOE
AAI	AEI	AII	AOI	EAI	EEI	EII	EOI
AAO	AEO	AIO	AOO	EAO	EEO	EIO	EOO
IAA	IEA	IIA	IOA	OAA	OEA	OIA	OOA
IAE	IEE	IIE	IOE	OAE	OEE	OIE	OOE
IAI	IEI	III	IOI	OAI	OEI	OII	OOI
IAO	IEO	IIO	IOO	OAO	OEO	OIO	OOO

But these are not all valid forms of reasoning. Some of them violate one rule, some another, and some even two rules. For example, EEA violates rule 6, and IIA violates rule 8, and IOA rules 8 and 9. By applying the several rules, including. 6, 7, 8, and 9, to this table we are enabled to reject all but *twelve* of these Moods, as violating one or the other of these rules, and as not possibly valid in any case. The twelve Moods remain as *possibly* valid, though they must first be tested by rules 4 and 5 before they can be accepted, and it will be found that some of them are valid in one Figure of the syllogism and not in another, while one of them will be found to be invalid in all of them. This is IEO. The possible Moods, however, remaining after applying the last four rules to the whole table are as follows:

AAA	EAE	IAI	OAO
AAI	EAO	(IEO)	
AII	EIO		
AEE			
AEO			
AOO			

These remain to be tested in the four Figures, so that there will be *forty-eight* forms still to consider.

VI. **FIGURES OF THE SYLLOGISM.**—The Figure of a syllogism is that characteristic of it which is determined by the *position of the middle term.* As there are two propositions, each with a subject and predicate, in the premises of every syllogism, there are *four* possible positions for the middle term. It may be the subject of both, the predicate of both, the subject of the major and predicate of the minor, or the predicate of the major and the subject of the minor premise. These positions and the several Figures are represented in the following diagram :

FIG. I.	FIG. II.	FIG. III.	FIG. IV.
M = P	P = M	M = P	P = M
S = M	S = M	M = S	M = S
S = P	S = P	S = P	S = P

The *twelve* possible Moods have to be tested in each of these Figures before we know the conditions under which they are valid at all. By applying the rules for the distribution of terms and the limitations upon correct reasoning, as determined by rules 4 and 5, we find that some of the twelve moods are valid in each Figure and some are not. Thus we have an illustration of this method in the mood AAA for all the Figures.

FIG. I.	FIG. II.	FIG. III.	FIG. IV.
A (M) = P	A (P) = M	A (M) = P	A (P) = M
A (S) = M	A (S) = M	A (M) = S	A (M) = S
A (S) = P	A (S) = P	A (S) = P	A (S) = P
1. VALID.	INVALID.	INVALID.	INVALID.

In the first Figure the rules for distribution are satisfied, and AAA is valid. But in the second Figure the middle term is not distributed in either premise, and the fallacy is called *Undistributed* or *Illicit Middle*. In the third Figure the minor term is not distributed in the minor premise, but is distributed in the conclusion. This gives an *Illicit Minor*. In the fourth Figure the same fallacy is committed, and hence AAA is valid in only one Figure. By applying the same test to all the twelve Moods in the four Figures we have the following as the valid and the invalid Moods in each Figure. A line is drawn across those that are invalid.

FIG. I.	FIG. II.	FIG. III.	FIG. IV.
AAA	~~AAA~~	~~AAA~~	~~AAA~~
AAI	~~AAI~~	AAI	AAI
AII	~~AII~~	AII	~~AII~~
~~AEE~~	AEE	~~AEE~~	AEE
~~AEO~~	AEO	~~AEO~~	AEO
~~AOO~~	AOO	~~AOO~~	~~AOO~~
EAE	EAE	~~EAE~~	~~EAE~~
EAO	EAO	EAO	EAO
EIO	EIO	EIO	EIO
~~IAI~~	~~IAI~~	IAI	IAI
~~IEO~~	~~IEO~~	~~IEO~~	~~IEO~~
~~OAO~~	~~OAO~~	OAO	~~OAO~~

Six Moods are valid in each Figure and six are invalid, so that we have in this representation a measure of the combination of propositions and forms of reasoning that are legitimate.

If we observe this list we shall notice that the First Figure is the only one which will give a universal affirmative conclusion, and it is the only one which will give conclusions in all four propositions, A, E, I, and O. The Second Figure gives only negative conclusions, and the Third Figure gives only particular conclusions. The Fourth Figure has never been regarded as important enough in argument, being so little used, to receive any attention from logicians, though it gives conclusions in E, I, and O. We have only to *mutate* or transpose the premises of the Fourth Figure in order to produce the First Figure.

VII. **REDUCTION OF MOODS AND FIGURES.**—The First Figure of the syllogism is the most natural form for most of our reasoning, at least when we are not engaged in the process of disproof. Consequently, looking at the perplexing number of Moods and Figures that are valid, the old logicians sought to reduce the various Moods in the other Figures into the valid forms of the First. The process is a rather complicated one and has no practical importance, and is impossible, directly, in the Moods AOO of the Second Figure, and OAO of the Third Figure. But without going through the scholastic method of reduction, and without guaranteeing that the method of reduction here indicated will result always in valid equivalents after the process has been accomplished, I may suggest a few simple rules for the reduction of the Moods in one Figure to those of another. The whole process can be effected by the proper adjustment of *conversion and*

mutation of premises. Thus, convert the major premise of the First Figure, and we obtain a syllogism of the Second Figure. Convert the major of the Second and we obtain the First Figure. Mutate the premises in either the First or Fourth Figure and we obtain the other, etc.

VIII. **PRACTICAL IMPORTANCE OF THE FIGURES.**— There is some difference between the various Figures in regard to their practical value. In the first place, they cannot all be applied to attain the same result, the Second Figure giving no affirmative, and the Third Figure no universal conclusion. The First Figure is the most natural and the most usual form of reasoning, and is regarded by logicians as the Figure best adapted to *proof*, especially as it will give all four propositions, A, E, I, and O, in its conclusion, and is the only one in which universal affirmatives are possible, which represent the most important forms of conviction. Again, the First Figure being the most natural and the most usual form of reasoning, it is interesting to remark that argument is not possible in it with a *particular major premise*, or a *negative minor premise*. Hence, the rule that we are liable to fallacy unless our *major premise is universal*, a fact which is true for all the Figures except IAI in Figs. III. and IV., and OAO in Fig. III. As these two Moods are perhaps never used in practical life, and the Figures very seldom, we can dismiss them and accept the rules as practically universal. In an argument, therefore, involving *proof*, we must see that our premises are universal if we wish to establish a universal conclusion.

The Second Figure is best adapted to *disproof*, or refutation. It is so adapted, partly because one of the premises must be negative, and chiefly because of the nature of the comparison which can be instituted between the subject and predicate. It is evident that two things which cannot agree in their predicate cannot agree with each other. In the First Figure a disagreement between the subject of one and the predicate of the other premise leads to fallacy. Hence, in order to disprove an assertion, we have only to show that one instance, or more, included in the general statement, does not agree with the predicate, and we have the contradictory established. For instance, if the assertion is made that "All forms of government are beneficial," it is evident by subalternation that "Despotic governments (some governments) are beneficial," though the assertor may not consciously recognize the fact when he makes the statement. Hence, the opponent may assert and prove (by the First Figure, EAE) that "Despotic governments are not beneficial." This last proposition will be the minor premise of a syllogism of which the major premise is the first proposition. This would give the conclusion, "Despotisms are not forms of government," a conclusion which contradicts what is implied by the subalternate of "All governments are beneficial," and so contradicts the original assertion. The affirmative will thus either have to give up his allegation or show that "Despotisms are not forms of government," and thus admit the possibility that they are not beneficial without suppos-

ing the contradiction indicated. The former position accepts the refutation; the latter has to meet an equivocation in the use of terms which is at least almost as fatal as a contradiction.

The Third Figure is adapted to the proof of exceptions to universals, and so may use its result for the disproof of some universal assertion. Suppose someone asserts that "No philosophers are wise." The easiest disproof of this, as we have seen, lies in the proof of the contradictory I. We have then only to take some syllogism in the Third Figure with this proposition as its conclusion; as follows:

Plato, Kant, etc., were wise.
Plato, Kant, etc., were philosophers.
∴ Some philosophers were wise.

Here we both prove that "Some philosophers are wise," and disprove the universal negative of the same proposition, assuming, of course, that our premises are true.

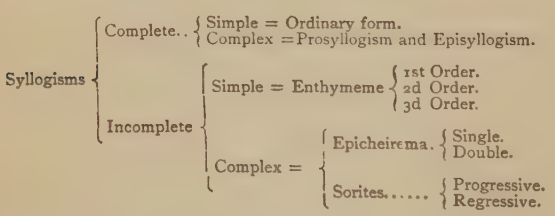
The Fourth Figure is not regarded by logicians as having any practical value.

CHAPTER IX

SIMPLE AND COMPLEX FORMS OF CATEGORICAL REASONING

I. CLASSIFICATION OF FORMS.—The syllogism as it has been explained was the simple syllogism of three propositions. All arguments can be reduced to this simple form, but while this is the fact much of our reasoning takes on a more complex form. Some propositions may be omitted in formal and explicit expression, though included in the thought of the reasoner, and in other cases, while the premises of the main argument are explicitly stated, they are complicated with various propositions, stated or implied, that are intended to prove them instead of merely asserting them. This introduces at least implied syllogisms into the discourse, which are subordinated to the main purpose. These two circumstances give rise to two divisions of the syllogism. They are the *Complete* and *Incomplete*, each with the subdivisions *Simple* and *Complex*. The complete syllogism represents an explicit statement of all that is involved in the mental process. This may not often occur in ordinary discourse, and when it does it is not likely to follow the formal expression which has been explained in the

Moods and Figures. The usual mode of argument is either to state the facts, leaving the hearer to draw the inference, or to state only one of the premises, leaving the other to be understood. But where it is necessary to be clear and explicit we formulate the argument into complete syllogisms of some form. They may all be classified as follows :



II. **EXPOSITION.** — The classification has shown us one simple and two complex forms of reasoning to be considered that have not been noticed. They are all reducible to the rules and form of the simple complete syllogism.

1st. **Prosyllogism and Episyllogism.** — The Prosyllogism and Episyllogism consists of two syllogisms, the conclusion of the first being a premise in the second. The following are illustrations, the one abstract and the other concrete :

A is B	Men are vertebrates.
C is A	Europeans are men.
∴ C is B	∴ Europeans are vertebrates.
D is C	Italians are Europeans.
∴ D is B	∴ Italians are vertebrates.

2d. **Enthymeme.**—An Enthymeme is an incomplete syllogism in which one of the premises, or the conclusion, may be omitted. If the *major* premise be omitted, the enthymeme is of the *first order;* if the *minor* premise be omitted, the enthymeme is of the *second order;* and if the conclusion be omitted, the enthymeme is of the *third order.* The signs of it are such words as indicate that a reason is given for the truth of the proposition asserted. These words are *for*, *because*, *since*, *inasmuch as*, and in the conclusion, *therefore*, *consequently*, etc. As an illustration we have the propositions: "The air must have weight, because it is a material substance." The conclusion in this instance is the statement, "The air must have weight." If we were stating a mere fact not looking to any further result, it might not require proof, but we often desire to support an assertion by reasons that will show its truth apart from mere acceptance on authority. In the above instance, the major premise is omitted, and is "All material substances have weight." When reduced, the enthymeme becomes a simple complete syllogism.

There are forms of the enthymeme in which the signs are not expressed, but which have to be determined by the evident relation of the thoughts stated. The definite and explicit use of the signs often give a stilted and formal appearance to discourse, and hence rhetorical reasons may be sustained for omitting them. The intended, or at least the implicit, reasoning in such cases must be discovered from the actual dependence logically

of one thought upon another. Hence, in much of the discourse that does not formally profess to be reasoning we shall find that process tacitly indicated, and it must be adjudged accordingly.

3d. **Epicheirema.**—An epicheirema is a syllogism in which one or both of the premises is supported by a reason which implies an imperfectly expressed syllogism ; in other words, it is a syllogism in which one or both of the premises is an enthymeme of the first or of the second order. The epicheirema may be *single* or *double*. It is single when only one of the premises is an enthymeme ; it is double when both premises are enthymemes. Following are illustrations :

Single.

A is B ; for it is P.	Vice is odious, for it depraves.
C is A.	Avarice is a vice.
∴ C is B.	∴ Avarice is odious.

Double.

A is B ; for it is P.	Man is rational because he has a mind.
C is A, for it is Q.	Europeans are men, because they are civilized.
∴ C is B.	∴ Europeans have minds.

The single epicheirema when reduced to a complete form becomes a prosyllogism and episyllogism, or two syllogisms. The double epi-

cheirema, when completed, becomes three syllogisms, representing two prosyllogisms and two episyllogisms, one of the three being both a prosyllogism and an episyllogism, the former in relation to the following and the latter in relation to the preceding syllogism. An illustration of this is the following :

Man is rational, for he has a mind { Whatever has a mind is rational. Man has a mind. ∴ Man is rational.

Europeans are men, for they are civilized { Whatever is civilized is man. Europeans are civilized. ∴ Europeans are men.

∴ Europeans are rational.

4th. **Sorites.**—A sorites is so called because the propositions constituting it form what is regarded as a "chain," or a continuous series, of premises from which a conclusion is drawn at the end of the series, but not before. It consists of enthymemes of the *third order*, as the epicheirema consists of enthymemes of the first and second order. When completed, therefore, the sorites also forms a prosyllogism and an episyllogism, or a number of them. To complete it we have only to supply the omitted conclusion. The form of the sorites is twofold, *Progressive* and *Regressive*. The following are illustrations :

Progressive Series.

A is B.	Bucephalus is a horse.
B is C.	A horse is a quadruped.
C is D.	A quadruped is an animal.
D is E.	An animal is an organism.
∴ A is E.	∴ Bucephalus is an organism.

Regressive Series.

A is B.	An animal is an organism.
C is A.	A quadruped is an animal.
D is C.	A horse is a quadruped.
E is D.	Bucephalus is a horse.
∴ E is B.	∴ Bucephalus is an organism.

The difference between the progressive and the regressive sorites is only one of form in statement, not in the form of reasoning. The sorites may also be divided into the *constructive* and the *destructive*. It is constructive when the conclusion is *affirmative;* destructive when the conclusion is *negative*. The above illustrations are of the constructive form and represent the propositions as all of them universal affirmative, hence of the Mood AAA. But there are two more constructive Moods, AAI and AII, and three destructive Moods, EAE, EAO, and EIO, all six being of the First Figure.

The rules for the valid forms of the sorites should be stated, because the number of cases in which this mode of reasoning is legitimate is exceedingly limited. Any number of premises may be used, but the quantity and quality of the propositions constituting them are under strict limitations. The rules regulating their construction, therefore, are two, and are as follows:

1. Only one premise can be negative, and this must be the prime major.

2. Only one premise can be particular, and this must be the final minor.

Since the sorites is an incomplete prosyllogism

and episyllogism, there are intermediate major and minor premises. The prime major, therefore, will be the last premise in the progressive, and the first premise in the regressive, series. The final minor will be the first premise in the progressive and the last in the regressive series. If any other premise than the prime major be negative, the Mood being AEE, there will be a fallacy of illicit major, and if any other premise than the final minor be particular, the Mood being IAI, there will be a fallacy of illicit or undistributed middle.

CHAPTER X

HYPOTHETICAL REASONING

I. NATURE AND DIVISIONS.—We have already seen that there are three kinds of propositions which correspond to as many kinds of reasoning. These propositions are the Categorical, Hypothetical, and Disjunctive, and the forms of reasoning go by the same name. (A categorical syllogism is one in which all the propositions are categorical.) (A hypothetical syllogism is one in which one or more of the premises are hypothetical.) The main object of the latter is to secure a conditional conclusion, if not in its form of statement, certainly in its subject-matter. In categorical propositions and syllogisms we usually mean to assume or to assert the truth of our premises, and if our formal reasoning be correct we can accept the conclusion as a true proposition. But often we wish first to bring out, if only conditionally, the truth upon which a proposition rests, so as to see if the connection between this conclusion and the major premise be admitted. The whole question will then depend upon the manner of treating the minor premise. This has the advantage of getting the major premise admitted without the formal procedure of proof, and the minor premise is usually more easily proved than the

major. Consequently, one is made to see more clearly the force of the argument or reasoning by removing the question of the material truth of the major premise and concentrating attention upon the relation between the conclusion and its conditions, so that we know clearly what we have first to deny if we do not wish to accept it.

The divisions of hypothetical reasoning are *Simple* and *Dilemmatic*. Simple hypothetical reasoning is further divided into *Constructive* and *Destructive*. Dilemmatic reasoning is also divided into *Constructive* and *Destructive*, and each of these into *Simple* and *Complex*. The following table outlines these divisions:

- Hypothetical Syllogisms
  - Simple
    - Constructive.
    - Destructive.
  - Dilemmatic
    - Constructive
      - Simple.
      - Complex.
    - Destructive
      - Simple.
      - Complex.

II. SIMPLE HYPOTHETICAL SYLLOGISMS.

The simple hypothetical syllogism is a form of reasoning in which either one or both premises are single hypothetical propositions. Most frequently it is the major premise alone that is conditional, while the minor premise and conclusion are thus categorical. The proposition called hypothetical, and regarded as single, really consists of two propositions, one of which is dependent upon the other. That part of it which expresses the condition is called the *antecedent*, and that part which depends upon their condition is called the *consequent*. The condition is indicated by some such terms as *if*, *supposing*, *granted that*, *provided that*, *although*, *had*, *were*, etc. The con-

sequent has no sign. But an illustration of the hypothetical proposition is "If the sea is rough, it is dangerous," of which the first part is the antecedent, and the second part is the consequent.

The minor premise either categorically or hypothetically affirms or denies one or the other of the two terms in the major premise, and as this must always be a hypothetical proposition, antecedent or consequent may be either affirmed or denied. This gives *four* forms, or Moods, to be considered, two of which are valid and two invalid modes of reasoning. The two valid Moods are called the *modus ponens*, or Constructive, and the *modus tollens*, or Destructive hypothetical syllogisms. The *modus ponens* means that if the antecedent be affirmed categorically in the minor premise, the consequent must be affirmed categorically, or follows as a categorical conclusion. The only effect of a hypothetical minor premise is to make the conclusion hypothetical. The *modus tollens* means that if the consequent be denied, the antecedent must be denied. The two forms are illustrated by the following:

Modus Ponens.

If A is B, C is D.		If Iron is impure, it is brittle.
A is B.	or	Iron is impure.
∴ C is D.		∴ Iron is brittle.

Modus Tollens.

If A is B, C is D.		If the sun shines, it is light.
C is not D.	or	It is not light.
∴ A is not B.		∴ The sun does not shine.

The rule, therefore, for the valid forms of hypothetical reasoning is that *either the antecedent must be affirmed or the consequent denied*. The general reason for this will appear in the reduction of hypothetical syllogisms.

The two false Moods are illustrated as follows :

1st Form.

If A is B, C is D.		If it rains, it is cloudy.
C is D.	or	It is cloudy.
∴ A is B.		∴ It rains.

2d Form.

If A is B, C is D.	If Gold were cheap, it would be useful.
A is not B.	Gold not cheap.
∴ C is not D.	∴ Gold is not useful.

The first of these is the *fallacy of affirming the consequent*, and the second, the *fallacy of denying the antecedent*. The general rule is *that affirming the consequent or denying the antecedent causes a fallacy*. The reason that affirming the consequent leads to a fallacy is the fact that the condition mentioned in the major premise may not be the only one determining the consequent. Some other condition of it might be true also, and affirming the consequent would involve this also, but there is no way of determining what it is. It might be true, for instance, that "If it is not raining, it is cloudy," and if affirmation of the consequent entailed the antecedent, we could as well conclude

that "It is not raining," or that "It is raining," two contradictory conclusions from the same premise. Hence, we have no right to draw any inference whatever. A concrete illustration will make this still clearer. If a man's character be avaricious, he will refuse to give money for charity; but it does not follow that every person who refuses to give money for charity is avaricious, as can be seen by the impossibility of simple conversion in this proposition. There may be many proper reasons other than avariciousness leading him to refuse; he may have no money, he may feel that it would do more harm than good, or he may have some better object in view. No inference therefore can be drawn from the affirmation of the consequent.

In the case of denying the antecedent the fallacy is due to the same causes as in the first case. The antecedent is not the only possible condition of the consequent, and hence the denial of it will not prevent the consequent from being a fact existing by virtue of dependence upon other conditions. It is apparent in the concrete illustration given that other qualities besides cheapness might make gold useful, and therefore the absence of this quality would not remove the usefulness of the metal.

Difficulties and exceptions to this dictum appear in many cases, such as:

If fire is hot, it will burn.
Fire is not hot.
∴ It will not burn.

But in such instances the apparent correctness of the reasoning depends upon other characteristics than the *form of statement*, which is all that formal logic can recognize. The meaning of the major premise in all such cases is either that of a definition making subject and predicate convertible, or that of an exclusive proposition making the syllogism, when the major premise is converted from the exclusive to a universal proposition, a simple *modus tollens*, one denying the *consequent.* In practical reasoning, therefore, we should be on the alert for instances which appear to be valid and yet appear equally to violate the formal rules, but which when interpreted rightly conform to them.

One important observation must be made in order to determine when we are affirming and when denying either term of the hypothetical proposition. We found that either the antecedent or the consequent, or both antecedent and consequent may be negative, as :

(a) If A is B, C is not D.
(b) If A is not B, C is D.
(c) If A is not B, C is not D.

In all such cases the minor premise must be negative in order to affirm, and affirmative in order to deny a term, antecedent or consequent, that is negative.

III. **DILEMMATIC REASONING.** — The dilemma differs from the simple hypothetical syllogism, not in the form of reasoning, but only in the fact that either the minor premise, or both minor

premise and the conclusion may be disjunctive propositions, and in the fact that the major premise consists of two hypothetical propositions. (The first form of it is the *simple constructive dilemma*:)

If A is B, C is D; and if E is F, C is D.
Either A is B, or E is F.
∴ C is D.

We observe in this and all similar cases that the *consequent is the same* for both antecedents. This gives as its distinctive mark a *categorical conclusion*. A concrete illustration is the following:

"If a science furnishes useful facts, it is worthy of being cultivated; and if the study of it exercises the reasoning powers, it is worthy of being cultivated; but a science either furnishes useful facts, or its study exercises the reasoning powers; therefore it is worthy of being cultivated."

(The second form is the *complex constructive dilemma*)

If A is B, C is D; and if E is F, G is H.
Either A is B, or E is F.
∴ Either C is D, or G is H.

In this instance the *consequents* are not the same, and this results in a *disjunctive conclusion* which is the distinctive mark of the complex constructive dilemma. The following is a concrete illustration:

"If a statesman who sees his former opinions to be wrong does not alter his course, he is guilty of deceit; if he does alter his course, he is open

to the charge of inconsistency; but he either does not alter his course, or he does alter it when he remarks a change of opinions; therefore he is either guilty of deceit, or is open to the charge of inconsistency."

The *destructive dilemma* also takes two forms, the simple and complex. The conclusion is again categorical in the former and disjunctive in the latter. The following is the form of the simple destructive dilemma:

If A is B, C is D; and if E is F, C is D.
But C is not D.
∴ Neither A is B, nor E is F.

A concrete illustration is: "If it rains, the river rises; and if the tide flows, the river rises; but the river does not rise, and therefore it neither rains nor does the tide flow."

The complex destructive dilemma takes the following form:

If A is B, C is D; and if E is F, G is H.
Either C is not D, or G is not H.
∴ Either A is not B, or E is not F.

The concrete example is: "If this man were wise, he would not speak irreverently of Scripture in jest; and if he were good, he would not speak irreverently in earnest; but he either speaks of it irreverently in jest, or he does it in earnest; therefore he is either not wise, or not good."

The fallacies in the dilemma are the same as in the simple hypothetical syllogism, and arise from

the attempt to draw a conclusion after affirming the consequent or denying the antecedent.

IV. **REDUCTION OF HYPOTHETICAL TO CATEGORICAL REASONING.** — The form of statement and the language of the rules in hypothetical reasoning do not betray the fact that it can be reduced to categorical form, but this is the fact, and it shows a simpler conception of the general process than might be imagined from the division into the three types. It enables us also to see the Moods and Figures in categorical syllogism to which the Moods of the hypothetical syllogism are equivalent. In all cases, therefore, of hypothetical reasoning, which we wish to reduce to the categorical form, we have only to regard the *antecedent of the hypothetical proposition as the subject of the categorical, and the consequent of the hypothetical proposition as the predicate of the categorical.* In some cases this change is a very simple one; in others it can be effected only by a circumlocution. The following is an illustration of this reduction in the simpler form:

Hypothetical.

If iron is impure, it is brittle.
Iron is impure.
∴ Iron is brittle.

Categorical.

Impure iron is brittle.
Iron is impure.
∴ Iron is brittle.

Where we have to supply a circumlocution, such phrases as "*the case of*," or "*the circumstances that*" must be used, as in the following instance :

Hypothetical.

If Aristotle is right, slavery is a legitimate institution.
Slavery is not legitimate.
∴ Aristotle is not right.

Categorical.

The case of Aristotle being right on slavery is a case of slavery being a legitimate institution.
Slavery is not legitimate.
∴ Slavery is a case of Aristotle not being right.

If now we look at the first instance of the hypothetical syllogism reduced to the categorical, we shall discover that it is equivalent to AAA of the First Figure in the categorical. This is a case of affirming the antecedent and is valid, as also AAA of the First Figure always is. But if we affirm the consequent in any case we affirm the predicate of the categorical proposition, according to the rule for the reduction, and hence we obtain AAA of the Second Figure in the categorical syllogism, which is an error of *illicit or undistributed middle.* But if in the minor premise we deny the antecedent, we have a case of AEE of the First Figure, which, as we have before seen, is a fallacy of *illicit major.* If we deny the consequent, we have a case of AEE of the Second Figure, which is valid. Hence,

when the four forms of hypothetical syllogism are reduced to the categorical, assuming the major premise to be affirmative, we have *four* Moods in the categorical syllogism representing the reasoning in the hypothetical. These are AAA, affirmative Moods, of the both Figures, and AEE, negative Moods, of the both Figures, only one in each case being valid. If the major premise of the hypothetical syllogism be negative, we may also have the forms EAE of both the First and Second Figures. If the minor premise be particular, according as it is affirmative or negative, we may have the Moods AII, AOO, and EIO of both Figures.

CHAPTER XI

DISJUNCTIVE REASONING

I. NATURE OF DISJUNCTIVE REASONING.—A disjunctive syllogism is one which is determined by the presence of a disjunctive proposition in the major premise, and in the conclusion also when the disjunction in the major premise contains more than two terms. A disjunctive proposition we have already learned to be one which contains alternative predicates for the subject in which *either* and *or* are used to denote a choice between two terms. Wherever "*either—or*" is found in such propositions, the expression means that only one of two things can be affirmed of the subject, and that the other or others must be denied. Thus, when we say that "The weather is either clear or cloudy," we mean that it is one, it cannot be the other. It is this kind of proposition that determines the nature of the disjunctive syllogism and the manner of drawing its inferences.

But there is an ambiguity in the use of the expression "either—or." One of these uses implies a contradiction or mutual exclusion between the terms of the disjunction. This is the proper logical use of the expression in defining disjunctive

propositions. The second meaning of the expression is that *either term of the apparent disjunction may have an affirmative connection with the subject without implying that the other is negative*, or that *at least one of them is true, though both may be.* This is illustrated in the proposition, "Gibbon was either very talented or very industrious." Here we mean that at least one of these qualities must be present in the subject, in order to explain certain facts. Such cases, however, are not true disjunctive propositions, as they have to be conceived for disjunctive reasoning. They give rise to what is called *the fallacy of incomplete disjunction*, a form of *petitio principii*, or begging the question, considered from the point of view of correct disjunctive propositions. The true disjunctive proposition must use "either—or" to denote reciprocal exclusion between their predicates. The proper way, therefore, to test whether a proposition is *materially*, as it may be *formally*, disjunctive is to convert it into its equivalent hypothetical propositions, and see if the consequent necessarily follows in both cases. Thus, in the proposition "A is either B or C," we have a case which can be resolved into "If A is B, it is not C," and "If A is not B, it is C." If we find that both propositions are true in this result, we may safely assume that the disjunction is materially what it is formally. Otherwise, while the formal reasoning may be correct, the material conclusion may be false, owing to the incomplete disjunction in the major premise. There is no *formal* fallacy in disjunctive reasoning. The reason for this will be seen when

discussing its reduction to the other forms. But one important fact must be noted, and it is that when we say "A is either B or C," we mean both "if A is B, it is not C" and "if it is not B, it is C," etc. This brings out the formal exclusion expressed by the expression "either—or."

II. **FORMS OF DISJUNCTIVE REASONING.**—There are two forms of disjunctive reasoning, called the *modus ponendo tollens* and the *modus tollendo ponens*. The meaning of the first is that *if we affirm one of the alternatives we must deny the other*, and of the second, that *if we deny one of the alternatives we must affirm the other*. An illustration of each is the following:

Modus Ponendo Tollens.

A is either B or C.	Oak trees are either tall or short.
A is B.	Oak trees are tall.
∴ A is not C.	∴ Oak trees are not short

If we said "A is C," the conclusion would be "A is not B;" or that "Oak trees are short," it would be "Oak trees are not tall."

Modus Tollendo Ponens.

A is either B or C.	The air is either cool or warm.
A is not B.	The air is not cool.
∴ A is C.	∴ The air is warm.

The case of incomplete disjunction can be illustrated as follows:

Gibbon either had great talents or he was very industrious.
He had great talents.
∴ He was not very industrious.

There is no error in the process of reasoning in this latter instance, but only in the assumption that the disjunction in the major premise represents a contradiction or mutual exclusion between the predicates.

III. **REDUCTION OF DISJUNCTIVE SYLLOGISMS.**—We have found earlier in this treatise that a disjunctive proposition is categorical in its *form*, but hypothetical in its *meaning*. Proceeding upon this fact, we can give it hypothetical expression, and then, if need be, categorical expression without disjunctive form, so that we should have but one set of principles to which all formal reasoning can be reduced. But if a disjunctive proposition can be reduced to a hypothetical one, as the alternative predicates, implying the connection of one and the exclusion of the other from the subject, enables us to do, we have a simple illustration of this reduction in the following syllogisms :

Disjunctive.	*Hypothetical.*
A is either B or C.	If A is B, it is not C.
A is B.	A is B.
∴ A is not C.	∴ A is not C.

The Moods which this process will ultimately represent will depend upon whether the minor

premise of the disjunctive syllogism be affirmative or negative, or whether we state the hypothetical equivalent of the major premise in an affirmative or negative form. This can be worked out for each case without illustration here.

One peculiarity in the disjunctive syllogism makes it appear to violate certain rules already laid down about legitimate reasoning. We notice that in disjunctive syllogisms we may have a negative conclusion when both premises are affirmative, or an affirmative conclusion when one of the premises is negative. This is shown in the illustrations which exhibit the two forms of this syllogism, where there is a negative conclusion in the *modus ponendo tollens*, and an affirmative one in the *modus tollendo ponens*. But this exception is only apparent. The major premise of a disjunctive syllogism actually contains or implies two propositions when we come to state its meaning; perhaps even four. "A is either B or C" means that "If A is B, it is not C;" that "If A is not B, it is C;" that "If A is C, it is not B;" and that "If A is not C, it is B." This will show that what appears as an affirmative proposition really implies a negative by virtue of the contradiction expressed in the disjunction, and the implication that the two or more predicates cannot be affirmed of the subject at the same time. This is apparent when the major premise of the disjunctive is converted into the major premise of the hypothetical syllogism. Here if the form "A is either B or C" is reduced to the hypothetical "If A is B, it is not C," we have a negative proposition for the major premise

of the hypothetical syllogism, and its categorical form, so that the *modus ponendo tollens* of the disjunctive will become the *modus ponens* of the hypothetical, and EAE of the categorical syllogism, which gives a negative proposition for its conclusion. By a similar process we could explain why it seems that an affirmative conclusion can be drawn when one of the premises is negative. In this we see that the *modus ponendo tollens* of the disjunctive becomes EAE of the First Figure in the categorical syllogism, and the *modus tollendo ponens* AAA of the First Figure in the categorical. It is thus the complex character of the disjunctive proposition that causes the apparent exception, but its real conformity to the regular rule for reasoning.

CHAPTER XII

FALLACIES

I. DEFINITION AND DIVISIONS.—The term "fallacy" is derived from the Latin *fallo*, denoting deception, and comes to mean illusion, or error. But in Logic "fallacy" must be distinguished from illusion, in its psychological sense. An *illusion*, even perhaps in all cases, is a false interpretation or construction of the data of sense-perception; a *fallacy* is an error in reasoning. This latter term, however, is often applied to those errors which are liable to occur in the interpretation of ambiguous propositions, made so by the displacement of a word or phrase, or by the vocal accent. This is illustrated in the so-called *semi-logical* fallacies of *Accent* and *Amphibology*, both giving rise to different meanings in a proposition. But in the true logical sense these errors are not fallacies, but rhetorical illusions. They may give rise to fallacies in reasoning by rendering the data uncertain and equivocal, but they are not errors in the reasoning itself. They are simply errors of interpretation and expression.

The fallacies with which logic deals may be divided into *Formal* and *Material*. They are all

errors in the inference or transition of the mind from one proposition to another. But a *formal fallacy* is an error that arises from a violation of the formal laws of the syllogism. It is incident to the form or statement of some proposition in relation to another, or, as it is often called, a fallacy *in dictione* or *in voce*. It arises out of an error in the distribution of terms and in reasoning from premises forbidden by rules *six* and *nine*. On the other hand, a *material* fallacy is one which is due to some peculiarity in the subject-matter of the reasoning, and hence arises independently of the form of statement; that is, independently of the quantity and quality of the propositions, and so is said to be *extra dictionem*. The formal reasoning may be correct enough, but owing to some error in the material elements of the process the conclusion may be vitiated, as in the ambiguity of terms, the assumption of actually false premises, or the assumption of matter not found in the premises. The formal fallacies can be detected by anyone who can understand merely the formal laws of reasoning, but material fallacies require that the reasoner be familiar with the subject-matter of the discourse or argument. In Political Economy, for instance, anyone familiar with formal reasoning could detect formal fallacies without knowing anything about the subject itself, but in order to discover material fallacies he must know enough about the subject and laws of Political Economy to recognize equivocal terms, false propositions and material in the conclusion transcending the premises.

II. **FORMAL FALLACIES.**—Formal fallacies have been sufficiently defined as determined by the nature of the premises and errors in distribution. Their classification remains to be briefly considered.

1st. **Illicit Process of the Middle Term.**—This fallacy grows out of the failure to have the middle term distributed at least once in the premises. It is illustrated as follows:

Some Pennsylvanians are Americans.	I M = P
All Philadelphians are Pennsylvanians.	A (S) = M
∴ Some Philadelphians are Americans.	I S = P

2d. **Illicit Process of the Major Term.**—The illicit major is due to the distribution of the major term in the conclusion when it is not distributed in the premise. Following is an illustration:

All men are carnivorous.	A (M) = P
Some animals are not men.	O S x (M)
∴ Some animals are not carnivorous.	O S x (P)

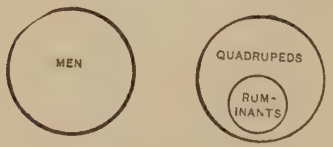
3d. **Illicit Process of the Minor Term.**—The illicit minor arises from the distribution of the minor term in the conclusion when it is not distributed in the premise. Following is an illustration:

No Caucasians are negroes.	E (M) x (P)
All Caucasians are mortal.	A (M) = S
No mortals are negroes.	E (S) x P

4th. **Illicit Process with Negative Premises.**—The fallacy in this instance is not due to an error in the distribution of terms, but to the attempt to

reason to what is not implicitly or explicitly included in any of its parts in the premises. Illicit distribution is a *partial* transgression of the premises quantitatively considered, while the present fallacy is a *total* transgression of them, and so must be illustrated in another way in addition to the exhibition of distribution. Following is an illustration :

No men are quadrupeds. E (M) x (P)
No ruminants are men. E (M) x (S)
∴ ———————— — ———



or

Fig. VIII.

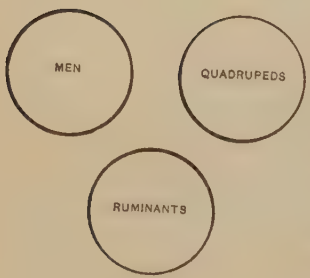


Fig. IX.

Either one of the diagrams in this instance will represent the possible relations of subjects and predicates. But there is nothing specifically said or implied that will enable us to say whether "ruminants" are included in "quadrupeds" or excluded from them. Consequently, we can infer neither an affirmative nor a negative exclusion.

5th. **Illicit Process with Mixed Premises and Conclusions.**—This is the fallacy of drawing a

negative conclusion from affirmative premises and an affirmative conclusion when one of the premises is negative. The mode of illustrating it or representing it by diagrams will be somewhat similar to that of negative premises, and also like it cannot be represented by the method of distribution.

The fallacy of particular premises and that of drawing a universal conclusion when one of the premises is particular, are instances of illicit distribution of terms either of the middle, major, or minor.

III. **MATERIAL FALLACIES.**—Material fallacies have been defined as errors growing out of the subject-matter of the conceptions and propositions constituting a syllogism. They can all be reduced, with only the apparent exception of the *petitio principii*, to what is called the fallacy of *Quaternio Terminorum*, or Four Terms. We found in one of the rules regulating the formation of the syllogism that it must have three and only three terms. Four terms make it impossible to reason, because they introduce matter that prevents comparison by a middle term. In some form or other all the material fallacies reduce to this one type of four terms. This introduction of *new* matter may be either in the *premises* or in the *conclusion*. It may be introduced into the premises in *two* forms, and into the conclusion in *two* forms. *First*, the middle term may have a different meaning in each premise. This makes it equivocal and equivalent to the use of four terms. *Second*, the major and minor terms may each or either of them have a different meaning in the premise from that in the

conclusion. This again gives a double signification to them, which is equivalent to four terms. But this form of four terms, which is due to a double meaning of the words, may be called *Equivocation*, the first class of material fallacies. *Third*, the error may grow out of assuming a premise or premises which may be false, or require to be proved. *Fourth*, we may assume new matter without equivocation in the conclusion when the premises are true or not disputed. In both of these assumptions *we take something for granted*, which should either be proved or shown to be contained in the premises. These two forms of fallacy may be called *Presumption*, as indicating some form of assumption that vitiates the conclusion, either as false because one or both of the premises are false, or as not contained materially within them. The two general material fallacies, therefore, will be *Equivocation* and *Presumption*. We shall consider them in their order.

1st. **Fallacies of Equivocation.**—Fallacies of Equivocation are due to the use of ambiguous terms, which often conceal their equivocal meaning even when the mind sees that there is something wrong with the conclusion. But there are two forms of equivocation which are based upon a certain *quantitative* import in terms on the one hand, and a certain *qualitative* import on the other. One of these deals with equivocations between Collective and Distributive terms and propositions, and the other with equivocations between Abstract and Concrete terms and propositions. The first of them divides into Fallacies of Com-

position and Division, and the second into Fallacies of Accident, which represent three specific forms.

1. *Composition and Division.* — These fallacies arise from the confusion of *collective* and *distributive* terms or propositions with each other. When the major premise is distributive and the minor premise collective, the fallacy in the conclusion is called one of *Composition.* When the major premise is collective and the minor premise is distributive, the fallacy is one of *Division.* To put the matter in another form, to argue from a distributive to a collective use of a term is to commit the fallacy of composition; to argue from the collective to the distributive is to commit the fallacy of division. The following are illustrations of the fallacy of Composition:

All the angles of a triangle are less than two right angles.
A, B, C together are the angles of a triangle.
∴ A, B, C together are less than two right angles.

In the major premise of this syllogism the proposition is true if taken to mean that *each* angle is less than two right angles, but we have attempted to argue from this truth to the supposed case that the same angles *taken together* are less than two right angles, which is false. A similar case is the following:

Thirteen and seventeen are prime numbers.
Thirty is thirteen and seventeen.
∴ Thirty is a prime number.

In the major premise "thirteen" and "seventeen" are *each* prime numbers; in the minor

premise they are *together* equal to thirty. Hence, we are trying to argue from the distributive to the collective in the conclusion, "Thirty is a prime number," which is false.

Again, if we were to argue that, because "All the peers derived their title from the crown," and "The House of Parliament consisted of all the peers," therefore, "The House of Parliament derived its title from the crown," we should be committing the fallacy of composition. So also we cannot argue from the truth of the individual incidents of a story, as having independently occurred, to the truth of the narrative as a whole, or collectively taken.

Illustrations of the fallacy of Division are the following :

All the angles of a triangle are equal to two right angles.
A is an angle of a triangle.
∴ A is equal to two right angles.

In this instance the major premise is true collectively ; that is, the proposition is true on the assumption that the phrase "All the angles" means "All the angles *together*." But the minor premise is distributive, and hence also the conclusion, which asserts, falsely, of course, what is true only of a collective term in the major premise. Another illustration exhibits the same fact :

The Germans are a nation.
Bismarck and Stein are Germans.
∴ Bismarck and Stein are a nation.

It would be a similar fallacy to argue from the fact that Congress had voted for a subsidy, that Mr. A——, a member of Congress, had voted for it. So it would be to argue that every individual house made a city, because a collection of them, including these individual instances, made a city. The individual items of expense in a bill need not be large because the aggregate is large.

2. *Fallacies of Accident.*—The fallacies of Accident arise from equivocations in terms expressing different totals of attributes or qualities. Here we have to do with the various attribute meanings of conceptions. For instance, the term "chair" means now a piece of furniture, and again the presiding officer of an assembly; or "paper" is now a kind of substance, and again the sheets of that substance used for printing the news. Now if we argue from one of these meanings to the other, we commit some kind of a fallacy of Accident. This term comes from its application in the classification of ideas. We found in dealing with the predicables and with Genus and Species that we required certain terms to express the *common* and certain terms to express the *distinctive* qualities of things. These were *conferentia* and *differentia*. *Essentia* or Essence, and *Accidentia* or Accident, express the same ideas. Conferentia denotes the common or essential, and differential, the distinguishing or differential, sometimes the accidental properties of things. This difference in the meaning of terms, some standing for only conferentia or common properties, making them *abstract*, as in all general abstract terms, and others standing for

both the conferentia and the differentia, making them concrete, as in all singular terms and the extensive use of general terms—this difference often gives rise to the equivocal use of certain terms, and a confusion of their abstract with their concrete use, or, as is sometimes said, their general with their particular application. Hence, if we undertake to argue from conferentia or essence (abstract) to differentia or accident (concrete), or *vice versa*, we commit some fallacy of Accident. This takes three forms : *Simple Accident*, *Converse Accident*, and *Specific Accident*.

(a) *Simple Accident.*—The following is an instance of Simple Accident in which we argue from what is true in general to a special case. It is a very old illustration :

What you bought yesterday you eat to-day.
You bought raw meat yesterday.
∴ You eat raw meat to-day.

A better illustration is the following, in which the argument is from the abstract to the concrete, or from what is true of the essential qualities under certain conditions, to what is supposed to be true in a particular form and without these conditions :

Intoxicating liquors are dangerous.
A glass of wine is an intoxicating liquor.
∴ A glass of wine is dangerous.

Here the major premise represents what is true, not in all forms and quantities of liquor, but only in regard to their essential characteristics, while

the conclusion asserts the same predicate of a special and small quantity of liquor. In both instances the argument is from the general to the special case.

(b) *Converse Accident.*—As illustrations of Converse Accident we may take the following:

Loyalty to the government is the duty of the citizen.
Loyalty to Charles I. was loyalty to the government.
∴ Loyalty to Charles I. was the duty of the citizen.

Here we may find the equivocation either in the middle or the minor terms. The "loyalty to the government" may be of different kinds, or the "loyalty to Charles I." may be different in the minor premise from what it is in the conclusion. The latter supposition makes the case clearer, and we find that it represents reasoning from the purely *personal* loyalty of the minor premise to *political* loyalty, including an implied personal loyalty which might be impossible even if desired by the citizen. Perhaps a better illustration is the following:

Grape juice does not intoxicate.
Wine is grape juice.
∴ Wine does not intoxicate.

Here we plainly argue from the special form of "grape juice" to a more general form in which only the essential qualities of the original are to be found. It would be a similar fallacy to argue

from the contemptible character of one reformer in a particular cause to the conclusion that all reformers are bad.

(c) *Specific Accident.*—The case of Specific Accident is illustrated by the following syllogism in which the meaning of the terms that are equivocal represents the difference between two *species* rather than the difference between *genus* and *species*, or *vice versa :*

The end of life is its perfection.
Death is the end of life.
∴ Death is its perfection.

The term "end" is used in this instance with two distinct meanings, one of them denoting a *terminus*, and the other a *purpose*, though both are expressed by the same sound. This is simple equivocation, and has usually been called the fallacy of Ambiguous Middle, but it can be ranked with those of accident by remembering that we argue in it from one accident in a term to another accident in the same term. This will enable us also to see that the same fallacy is possible with the major and minor terms. Another illustration of the same fallacy is the following :

All criminal actions are punishable by law.
Prosecutions for theft are criminal actions.
∴ Prosecutions for theft are punishable by law.

In the major premise "criminal actions" means *conduct that is wrong or unjust*, and in the minor premise the same phrase means only a *suit at law*, which is not necessarily bad conduct. Hence,

there is an equivocation in the argument, which reasons from an accident of the term in one case to an accident of a different kind in the other.

(d) *Rules for Fallacies of Accident.*—The simplest rules for the detection of the various fallacies of accident may be formulated as follows, when they depend upon the *middle term:*

Simple Accident ..	The major premise true in a *general* sense. The minor premise true in a *specific* sense. The conclusion false.
Converse Accident	The major premise true in a *specific* sense. The minor premise true in a *generic* sense. The conclusion false.
Specific Accident..	The major premise true in any sense different from the minor. The minor premise true in any sense different from the major. The conclusion false.

When the fallacy turns upon the *minor* and *major* terms, the rules have to be expressed in a slightly different form.

Simple Accident = Substitution in the conclusion of a *specific* minor or major that is *general* in the premise.

Converse Accident = Substitution in the conclusion of a *general* minor or major that is *specific* in the premise.

Specific Accident = Substitution in the conclusion of one specific minor or major for another specific meaning of the same term in the premise.

2d. **Fallacies of Presumption.** — Fallacies of Presumption, as already defined, are those of either taking something for granted in the premises which ought to be proved, or of assuming new and irrelevant matter in the conclusion. They may accordingly be divided into two kinds : the *Petitio Principii*, or Assumption of the Principle, and the *Fallacia Consequentis*, or Inconsequence ; also generally called *Non Sequitur*. The former is usually charged when, the formal reasoning being correct, the conclusion is seen to follow from the premises, but is not accepted because one or both of the premises are denied ; the latter is charged when the premises are admissible, and, the formal reasoning being correct, the conclusion is seen to be either false or not included in them.

1. *Petitio Principii.*—The common name for this is Begging the Question, but it is here called Assumption of the Principle or general truth which is used for proof. It means that the proposition to be proved is in some way simply assumed without proof. We divide it into two forms, the *Petitio Argumenti*, or Begging the Question, and *Ignoratio Elenchi*, or Evading the Issue. Each of these is divisible into two forms, and will be discussed in the proper place.

(a) *Petitio Argumenti.*—This is here technically called Begging the Question, and means that the proof of any proposition is so assumed as to include the proposition under dispute. This assumption may be of a proposition more general than the conclusion, or really identical with it.

This circumstance gives rise to two forms of the *Petitio Argumenti ;* namely, the *assumptio non probata*, and the *circulus in probando.*

The *assumptio non probata* occurs when the proposition or propositions assumed to prove a given assertion can be questioned by those whom we may be endeavoring to convince. Suppose, for instance, that we have asserted the proposition that "Church and State should be united," and we were asked to prove it. To satisfy this demand we should be obliged to find a major and minor premise, or a series of arguments, in which the asserted proposition is included as a conclusion. The syllogism summarizing the process would stand as follows :

Good institutions should be united.
Church and State are good institutions.
∴ Church and State should be united.

In this argument, if the minor premise be admitted and no formal fallacy chargeable, there is no way to escape the conclusion but to deny the truth or the universality of the major premise, thus implying that the question is begged or assumed in the effort to prove it. It might be true that *most* good institutions should be united, but the exception of "church and state" might be the very instance that prevents my right to assume a universal major premise containing it.

It is not merely the failure to prove one's premises that constitutes the fallacy of begging the question. This failure must be one which occurs when proof is needed or demanded, and this is

when the premise in turn is treated as a conclusion to another argument. Hence, the begging of the question occurs only when the attempt to prove a proposition involves the assumption of it in a premise that the hearer or opponent does not admit. It is, perhaps, most frequent when trying to convince another of a given assertion, although it may also occur whenever we are trying to prove to our own minds a conclusion without assuring ourselves sufficiently of the stability of the premises upon which the conclusion rests. But it is most frequent in arguments with others, because the one condition of proof or conviction in such cases is that the opponent, reader, or friend admit the principle upon which the conclusion is to be established, while the subject himself may not require proof at all for his conviction, as he already accepts the proposition. But we cannot prove to another a truth with premises that he does not admit. He simply charges begging the question because he is not obliged to admit in the conclusion what he does not admit in the premises.

Moreover, a proposition in the conclusion may be true, and yet not be proved by the premises. The advantage of proving any proposition lies in making it a special case included under a general law or class of unquestioned character, so that when a person has admitted the larger, he must perforce admit the smaller. But there are instances in which we may dispute the *universality* of a principle or premise either to show that the conclusion *may*, so far as we know, be an exception, or to assert that it has not been *proved* by

such a process, however true the proposition to be proved may be in reality. This means that we may even charge a begging of the question when we admit the conclusion, if the premise does not contain it, and can be disputed. Suppose we assert that "All cattle have cloven feet," and are asked to prove it. The syllogism purporting to meet this demand may stand as follows :

All ruminants are cloven-footed.
All cattle are ruminants.
∴ All cattle are cloven-footed.

Now, though we admit the last proposition to be true as a matter of fact, yet we can say that it is not proved, and the question is begged by the major premise, if this is not universally true, but is assumed to be so for the sake of the argument. It is one thing to perceive the truth of a proposition, and it is another to prove it by a superior premise or condition. The charge of begging of the question, then, may be made, not only when the conclusion is denied, but also when it is not proved.

The *circulus in probando* is a species of begging the question which consists of what is called "arguing in a circle," or in assuming as proof of a proposition that proposition itself. Thus, it would be arguing in a circle to say that "Man is wise because he is intelligent and prudent ;" for "intelligence and prudence" are considered the same as "wisdom." So also would it be to argue that the "Weather is warm, because it is summer, and it is summer, because the weather is warm," and "Men never practise excess, because they are not

guilty of immoderate habits." Jevons gives the following illustration: "Consciousness must be immediate cognition of an object; for I cannot be said really to know a thing unless my mind has been affected by the thing itself." Here "to know" and "immediate cognition" are identical in meaning and cannot be used to prove each other. The difference between this fallacy and the *assumptio non probata*, as explained and illustrated, is that the "*circulus in probando*" assumes an identical proposition as proof, while the former assumes a more general one including or intending to include the conclusion.

The fallacy of reasoning in a circle occurs mostly in long arguments where it can be committed without ready detection. In such cases as are given above, the fallacy is perfectly obvious. But when it occurs in a long discourse it may be committed without easy discovery. It is likely to be occasioned by the use of synonyms which are taken to express more than the conception involved when they really do not. It is difficult to give any formal expression to this circumstance without resorting to complex syllogisms for examples. But if in the following case A and C are really identical in meaning, though apparently not so, we shall have a *circulus in probando*.

A is B.	Bimana are rational.
C is A.	Men are bimana.
∴ C is B.	∴ Men are rational.

Usually, however, the form is much more likely to take the form of a prosyllogism and an episyl-

logism in which we arrive at some proposition for proof which is absolutely identical with the proposition to be proved. The following example illustrates this fact:

C is B.	The months of the earth's aphelion are warm.
A is C.	The season from June to September is the months of the earth's aphelion.
∴ A is B.	The season from June to September is warm.
C is A.	Summer is the season from June to September.
∴ C is B.	∴ Summer is warm.

Here the term "summer" and "the months of the earth's aphelion" are absolutely identical in meaning, though concealed in the terms by which the propositions are expressed. It is therefore a case of reasoning in a circle.

(b) *Ignoratio Elenchi.*—This fallacy is properly defined as an *evasion of the issue.* It is sometimes called *irrelevant conclusion*, but this is equally applicable to the *non sequitur*, while the *ignoratio elenchi* is more properly an evasion of the issue, or a disregarding of the question to be proved. It also takes two forms, which are: *Evasio ad Dictionem*, or Evasion of Proof, and *Evasio ad Contradictionem* or Evasion of the Disproof.

The *evasio dictionem* is committed when we undertake to prove a proposition which we falsely assume to be identical with the real proposition at issue. Thus, if we announce the issue to be that

"Church and State should be united," and prove only that "Church and State are good institutions," we have evaded the issue. An illustration of the process and of the manner in which the evasion is committed is the following:

Ad rem.

Good institutions should be united.
Church and State are good institutions.
∴ Church and State should be united.

Non ad rem.

Social organizations are good institutions.
Church and State are social organizations.
∴ Church and State are good institutions.

The error in this instance lies in the assumption that the proof of the proposition "Church and State are good institutions" includes also the proposition "Church and State should be united."

There are several forms of this evasion which are legitimate for the purpose of convincing an opponent or the persons to whom we are appealing, but which are nevertheless not arguments directed to the issue by itself, and hence are treated as evasions of the question. The argument directed correctly to the issue is called the *argumentum ad rem*. The reasoning which ignores it, which I shall call the *argumentum ad personam* and which nevertheless may be useful for influencing an opponent, is divided into five forms: the *argumentum ad judicium*, *argumentum ad populum*, *argumentum ad hominem*, *argumentum ad verecundiam*, and *argumentum ad ignorantiam*. These may be briefly defined and illustrated.

The *argumentum ad judicium* is an appeal to general or universal consent and is consequently based upon the common judgments of mankind. It is used to establish a case where we suppose difficulties in getting facts to support the real issue. Thus, if we are asked to prove the existence of matter, the merits of democracy, or the truth of Ptolemaic astronomy, we may appeal to the universal belief of mankind as the ground upon which these convictions rest. The major premise would be "Whatever universal consent attests is true," etc., and the minor premise would be the conformity of the special case to this condition, and hence the conclusion. But it evades the issue because the question is not what men believe in the premises, but what the facts are.

The *argumentum ad populum* is an appeal to public opinion, or to the passions and prejudices of the people rather than to their intelligence. Thus, if the issue be the justice of protection or free trade, we may appeal to the interests and political passions of men rather than to reason and fact.

The *argumentum ad hominem* is an appeal to the practice, profession, or principles of the person to whom or against whom an argument is directed. It is an effective method of silencing an opponent, but it is not an *ad rem* argument and does not prove the issue.

The *argumentum ad verecundiam* is an appeal to authority, or body of accepted doctrines. It is valid for producing conviction when the authority is accepted by the persons to whom the appeal

is addressed, but it is not *ad rem* proof, and when not accepted by anyone is still more glaring as an *ignoratio elenchi.*

The *argument ad ignorantiam* is an appeal to a man's ignorance in order to produce conviction upon the ground of his inability to dispute the case.

These several forms of *argumenta* are essentially the same in their principles and import, and though they do not accomplish real proof, and to that extent evade the issue, yet they have the legitimate use of driving a man to define his position and to clear up the implied contradictions involved in the application of the *ad hominem* argument against him. An excellent illustration of both the legitimate and the illegitimate use of this form of argument is found in the story of Zeno and his argument against the possibility of motion. He maintained that, if motion be possible, a body must move either where it is or where it is not. He said that it could not move where it is, because it must be at rest to be in any given point. Then it could not move where it is not, because it is not there to move. Therefore, it could not move at all. Tradition has it, says De Morgan, that Zeno called in a physician to set a dislocated shoulder, and the physician badgered the patient by turning his argument about motion upon the philosopher to prove that his shoulder was not hurt. He argued that the shoulder must be put out of its place either where it was or where it was not, etc. This is an excellent case of the *ad hominem* appeal. It admirably exposes the philosopher's plight in his contention about

motion, but it neither proves nor disproves the possibility of motion. Nor is it a refutation of the assertion which is imputed in the story that the philosopher's shoulder was out of place. It only establishes a contradiction between his philosophic denial of motion and his present belief about the dislocation of his shoulder, a belief which implied the assertion of motion. The philosopher would only have to say either that this was not a case of motion, or that his shoulder was not displaced in order to recover his consistency and to indicate that his argument was not overthrown, while admitting that the physician's reasoning was correct. But he would have to yield something, hence he must either explain the contradiction or give up one of the alternatives. This is the value of the *ad hominem* argument.

The second form of the *ignoratio elenchi*, namely, the *evasio contradictionis*, remains to be considered. This means the evasion of the contradiction or disproof of an assertion. An illustration of this evasion is the following: Suppose that one man asserts that "A is not a thief," and produces his argument therefor, while it is the duty of an opponent to refute this assertion. What he ought to prove is that "A is a thief;" but if he only proves or tries to prove that "A is a rogue," he completely evades the issue. The whole case is illustrated as follows:

Proof.	*Disproof.*	*Ignoratio Elenchi.*
∴ A is not a thief.	∴ A is a thief.	∴ A is a rogue.

Here the opponent assumes that if he can only prove that "A is a rogue," he has won his case against the affirmative, when, in fact, he assumes the identity between this and the proposition "A is a thief," which is the contradictory. But he thus begs the question while he evades the issue, which is not that "A is not a rogue," but that "A is not a thief," "rogue" and "thief" being different things, so that he might be a rogue and yet not a thief.

2. *Non Sequitur.*—The fallacy is that of *False Consequent.* It arises in connection with the conclusion and not in connection with the premises. It therefore consists in *the introduction of new matter into the conclusion*, matter that is not contained in the premises. There is no special necessity for subdividing it into distinct forms, except that one class has received a separate name for the sake of particular convenience, and perhaps because of its frequent occurrence. If we must distinguish between kinds at all, which could be made as numerous as the classes of everything, it must be into the *non sequitur simplex*, and the *non causa, pro causa*, false cause, or *post hoc* fallacy, whose dictum is *post hoc, ergo propter hoc.* The simplest form in which this fallacy may occur can be illustrated in the following :

All men are rational.
Socrates is a man.
∴ Socrates is noble.

It is evident that this conclusion cannot follow from the premises. The major term is not "no-

ble," but "rational," and hence the former cannot follow. De Morgan gives a good illustration that is a little more complex:

Episcopacy is of Scripture origin.
The Church of England is the only Episcopal church in England.
∴ The church established is the church that ought to be supported.

Nothing here is said in the premises about "supporting the church," and hence cannot be inferred in the conclusion. This *non sequitur* closely resembles the formal fallacies of illicit minor and illicit major, but a wide difference nevertheless is marked in the fact that in the former the addition in the conclusion is new *quantity*, while in the latter it is new *quality;* that is, new subject-matter.

The fallacy of False Cause, or the *post hoc* fallacy, is the most important form of *non sequitur* to be considered. It consists in arguing *from a mere co-existence or sequence, a coincidence to causal or necessary connection.* Thus, to argue that a change of weather was due to the occurrence of a new moon because they coincided, once we may say, would be to commit this fallacy; or to attribute a pestilence to the appearance of a comet, a death in the family to an eclipse of the sun, good luck to carrying a bone in one's pocket—all these are cases of confusing *cause* with *coincidence.* The phrase *post hoc, ergo propter hoc*, meaning "after a fact, therefore because of it," describes this fallacy exactly. If we have observed a large number of such coincidences under various and

changing circumstances and conditions, we may be justified in *suspecting* a causal connection, but the coincidence is no proof of it, especially if it be either a single one or between phenomena that betray no intrinsic characteristics of necessary connection. This latter remark is true of even constant co-existences and sequences. We cannot infer that night is the cause of day on the ground of their constant conjunction. The idea of necessary or causal connection is not contained in that of merely actual connection, and it is a *non sequitur* to include this new matter in the conclusion when the premises express nothing more than co-existence or sequence. Thus, if I argue from the coincidence between the existence of a protective tariff and the fall in price of iron, I commit this fallacy, because I assume that there are no other possible causes of reduction in price. Similarly with any other such coincidence in which the conclusion contains new and different matter from the premises.

IV. **GENERAL OBSERVATIONS.**—It is important to remark that the errors in reasoning are capable of being looked at from different points of view, and hence are so interconnected that what may be one fallacy in one interpretation of the premises may be adjudged a different fallacy with another interpretation of the premises. Thus, to take the case of the *non sequitur* which we have just been discussing, we may reduce it in some cases to a *petitio principii*. For instance, we have said that to argue from the sequence of night and day to a causal connection was to commit

the *post hoc* fallacy. This is true if we look only at the material difference between what is here only a minor premise and the conclusion. But being merely an enthymeme, if we supply the major premise we have :

All immediate antecedents of day are its cause.
Night is the immediate antecedent of day.
∴ Night is the cause of day.

Here if the major premise be true the conclusion may follow, but a dispute on the truth of this premise reduces the argument to a *petitio principii*. Hence, what may be charged as a *non sequitur* in relation to the minor premise, may be viewed as a *petitio principii* in relation to the major premise. This will always be true of enthymemes when we observe that the conclusion is not contained in the stated premise.

A similar reduction can be made of the fallacies of accident. Take the following example :

Pine wood is good for lumber.
Matches are pine wood.
. Matches are good for lumber.

Here we have a fallacy of Simple Accident, due to arguing from the general to the special case, or from the abstract to the concrete. But calling it a fallacy of accident depends upon the question whether we admit the premises and do not admit the conclusion. We may, however, question the major premise in this case, or even the minor. We are tempted to admit the major premise because we know that "pine wood is good

for lumber," but we forget, perhaps, to observe the qualifications under which it is true. It should be noticed that the statement carefully omits to say either "All pine wood," or "All forms of pine wood," and hence expresses what is only *abstractly* true; that is, true of "pine wood" *as a substance*, and seeing this we may not notice the trap into which we fall until the conclusion is announced, which is palpably false. If this major premise be considered as universally true at all, it is only in the abstract sense that the *quality* of pine wood fits it for the purpose of lumber, but the minor premise has to do with pine wood in a special concrete form, and an equivocation arises which we may call a fallacy of accident, assuming that *formally* the reasoning is correct.

But we may dispute the truth of the major premise, if we like, as not being true in the concrete sense in which it ought to be true if the argument is to be valid, and hence we could charge the fallacy of *begging the question* by thus raising a doubt about the first condition of the argument. Again, we may maintain that the proposition, as true, is really a *particular* proposition; that, taken as true, it can only mean "Some pine wood is good for lumber," and in this interpretation we should have IAA of the First Figure, which represents the fallacy of *illicit middle*. Hence, according to the way we look at the propositions in this instance, we may have any one of three fallacies, *simple accident*, *petitio principii*, or *illicit middle*. A similar treatment of the fallacies of Composition and Division could be made, but it suffices to

show what the principle is in the previous instances.

Another important remark in this connection is that it is not necessary to put an argument into the form of a syllogism in all cases in order to discover what the fallacy is, if any. We have only to observe the quantity of the propositions serving as premises and conclusion, the relation between premises and conclusion, and the manner in which one term is substituted for another. In actual discourse the arguments are most frequently expressed either in the form of enthymemes, or in a manner to effectually conceal the syllogistic figures and moods, so that we are left entirely to depend upon the resources just mentioned for the detection of fallacies. Moreover, since the construction of enthymemes into complete syllogisms leaves us practically free to put them into either the First or Second Figures at pleasure, the first of these being formally valid in nearly all cases so reconstructed, we have always to allow for this as the possible meaning of the debater, and so look for material fallacies if we refuse to accept the conclusion. But when any doubt exists about the case, the only recourse is to throw the argument into syllogistic form.

Another important observation to make is the fact that the imputation of a fallacy in the reasoning does not necessarily imply that the proposition in the conclusion is a false one. The fallacy is not a reason for the falsity of a proposition, but is only an explanation of the failure to prove it. In some cases the reasoning may be valid and the con-

clusion false, or the reasoning fallacious and the conclusion be true, as a proposition. Reasoning avails only, when valid, to show the connection of the conclusion with the premises, and all of these may be either true or false without affecting the reasoning process. All that the existence of a fallacy, which is a violation of the rules for legitimate transition from term to term or proposition to proposition, can establish is a mistake in the mode of proving a statement, not the truth or falsity of it, except relative to the same quality in the premises. It is the perceived falsity of a statement that often leads us to question the validity of its deduction, but we cannot suppose that the process of reasoning determines either the truth or falsity of a proposition. It only settles whether it is implied by the premises, and its truth stands or falls with the same character in the statements from which the deduction is attempted.

CHAPTER XIII

INDUCTIVE REASONING

I. GENERAL NATURE OF INDUCTIVE REASONING.—Inductive inference has been distinguished from deductive reasoning ever since Logic was founded, but it has not always succeeded in keeping its meaning perfectly clear. It is important therefore that we should briefly explain the various uses of the term. This can be done by assuming the two divisions of Induction, which are commonly accepted. They are *Perfect Induction* and *Imperfect Induction.*

1st. **Perfect Induction.**—Perfect Induction is *an enumeration of the particulars that form a class.* It is the process which characterized the method of Socrates in reaching definitions. An example of it is the following: Mercury revolves on its axis; so do Venus, the Earth, Mars, Jupiter, Saturn, and Neptune. But these being all of the planets, we can say, "All the planets revolve on their axes." This appears to be in the form of reasoning, but in reality it is not reasoning. It should be called simply *Generalization.* All the individuals that constitute the class are simply enumerated, so that the generalized expression is but an economical device for avoiding the specific

mention of the individual cases. We do not include in this process more than is indicated in the premises, and, besides, it is not one of reasoning, which Induction, as here considered, should be.

2d. **Imperfect Induction.** — Imperfect Induction is *the process by which the conclusion extends beyond the data upon which it is based,* as Generalization does not go beyond it. If we had reasoned from the observed fact of *four* planets revolving around their axes, that *all* of them did so, we should have an inductive inference, because we *infer* some facts not observed. This is the true Inductive reasoning. Again, if I observe in a number of cases that a certain kind of cloud has been accompanied by a hail-storm, and infer that this will always follow this particular kind of cloud, I have performed an Inductive inference.

3d. **Definition of Inductive Reasoning.**—There have been several ways of defining this process. It has been usual to contrast it with Deduction. Now, deduction is often said to be reasoning from general to particular truths, from the containing to the contained truth, or from cause to effect. Induction, therefore, by contrast is defined as reasoning from the particular to the general, from the contained to the containing, or from effect to cause. Sometimes induction is said to be reasoning from the known to the unknown. This would be making deduction, by contrast, reasoning from the unknown to the known, which is absurd. The former ways of representing it are much the better.

But there is still a better way of comparing

them. Deduction, we saw, is reasoning in which the conclusion is contained in the premises. This is the ground of its certitude, and we commit a fallacy whenever we go beyond the premises, as shown by the laws of the distribution of terms. In contrast with this, then, we may call inductive reasoning the process by which we go beyond the premises in the conclusion. This is illustrated in such examples as have already been given for imperfect induction. To repeat examples, however, if we observe that red sunsets are frequently followed by clear days, we may infer that the same coincidence will occur in the future; or if we observe that the dew falls upon clear nights, and that clear nights are accompanied by a peculiar radiation of heat, we may infer a causal connection between this radiation of heat and the falling of the dew. Good illustrations also of this inference are Copernicus's discovery of the earth's motion around the sun, Kepler's law of planetary motion, Newton's theory of gravitation, the undulative theory of light from the eclipse of the satellites of Jupiter, etc.

The process here is to start from certain given facts and to infer some other probable fact more general or connected with them. In this we see the process of going beyond the premises. There are, of course, certain conditions which regulate the legitimacy of this procedure, just as there are conditions determining deduction. They are that the conclusion shall represent the same general kind as the premises, with a possibility of accidental differences. But it goes beyond the prem-

ises in so far as *known* facts are concerned. This can be shown best by studying the formal process.

II. **FORMAL PROCESS IN INDUCTION.** — We found that we could give formal expression to deductive reasoning in the Moods and Figures of the syllogism. The same can be done, to a limited extent at least, in induction. It is usual to state the forms for induction in the *Second* and *Third* Figures. It may be possible to do it in all the Figures, but we do not require in this work to develop the formal process in all its possibilities. Hence, we shall take those forms which most clearly exhibit both the probability of the inference and its passage beyond the premises. We take one in the Second Figure :

A Magnets attract iron.
A Loadstones attract iron.
A ∴ Loadstones are magnets.

In deductive reasoning this would be a formal fallacy of undistributed middle, but if we simply mean to suppose from the common attribute of attraction for iron that the two classes of substance are the same, and hold the idea as a probability merely, we are entitled to regard it as inductively legitimate. This is to say that the agreement of the two subjects in this particular suggests that they are of the same kind in general. The same kind of reasoning can be illustrated in the Third Figure :

A, B, C attract iron.
A, B, C are magnets.
∴ All Magnets attract iron.

Here we have, deductively, a fallacy of illicit minor, but inductively an inference that what proves true in certain known cases or particulars will prove true of the whole class. The inference or hypothesis here has only a degree of probability, and is not a necessary one as in deduction. The term hypothesis or supposition expresses exactly what this inductive inference is, and indicates how it is that we go beyond the premises or actually known facts, to what has some degree of possibility or probability. Thus, to illustrate again, if we find that two or three gases are compressible into liquids under certain degrees of temperature and pressure, we may well suppose it possible or probable, and to that extent rational, that other gases are compressible under some similar conditions. The supposition may require verification or proof before the mind is satisfied, but we make an hypothesis which is the inference to what is possible or probable, this varying in degree according to the nature and number of the facts upon which it is based.

It will be necessary to illustrate inductive reasoning by concrete examples which do not represent the formal process to which they can be reduced. For instance, it was observed that there were disturbances in the movements of certain planets which could not be accounted for by known causes. From what was known about causes and their effects in general it was inferred that there was some undiscovered planet which would account for the disturbance. This unknown planet, not being included in the premises of the

reasoning, is thus the object of an inductive inference. It is a conjectured cause of a known effect, and only awaited verification, as it received this by the experiments of Leverrier and Adams, in order to become an assured object of knowledge. Again, it was observed that the specific gravity of nitrogen taken from the air is greater than nitrogen taken from all other sources. It was inferred from this that there must be some other substance to account for this difference. Finally, argon was discovered. Still, again, I observe the rise in price of certain stocks. I may infer several causes of it, but if I know the circumstances well enough, I may infer the probability, for instance, that some agreement is maturing between rival companies. I may notice again that frequently the appearance of a rainbow is followed by clear weather, and hence may infer from observation in any particular case the re-occurrence of the same clear weather. In all of these instances my reasoning is from some specific facts to a general rule comprehending more than the special cases.

III. **INDUCTIVE FALLACIES.**—It is not easy to indicate the inductive fallacies, if it be even possible, in the formal process of induction. In deduction they consist of violating the laws of the quantification of terms ; that is, in going beyond the premises and endeavoring at the same time to retain the same certitude in the conclusion as was supposed in the premises. But induction permits us to transcend the premises, *quantitatively* at least, and there can hardly be any formal fallacies

in this, unless we except the case of negative premises. But all this is a matter for more advanced logic to determine. It is certain, however, that in respect to the subject-matter of the conclusion in inductive reasoning there are some very definite limitations upon the right to transcend the premises. We cannot infer anything we please from any premises we please. We must conform to certain definite rules or principles. Any violation of them will be a fallacy. These rules are the same as those for material fallacies in deduction, so that the fallacies of induction, whether they are ever formal or not, are at least material ; that is, they occur whenever equivocation and presumption are committed. There are, then, two simple rules which should not be violated. (1) The subject-matter in the conclusion should be of the same general kind as in the premises. (2) The facts constituting the premises must be accepted and must not be fictitious.

CHAPTER XIV

PROOF AND ARGUMENTATION

I. INTRODUCTION. — Description, Explanation, and Exposition were examined as processes by which we endeavor to narrate facts and thoughts in a systematic and orderly manner. They are designed to give an intelligible and methodical conception of the data that are connected with a particular theme. But they are not designed to convince the mind. They may incidentally do this, but it is not their primary object to create conviction. They are occupied with the formation and presentation of clear conceptions, systematic and methodical discourse, which does as much to make ideas intelligible as it does to please the sense of order. But Proof and Argumentation go beyond this. They endeavor to convince, to remove doubt, to give belief and knowledge to the intellect. It will be necessary to examine its nature and its kinds.

1st. **Nature of Proof.**—Proof is defined as a method of producing conviction ; that is, of creating assent to propositions. This assent takes two forms : *Belief*, or probable truth ; and *Knowledge*, or certain truth. Whenever any proposition is asserted or made the subject of argument, the ob-

ject is to show whether it be true or false. The general method of argumentation is the same for both sides. But the proposition at the outset is supposed not to represent any conviction in favor of or against itself, but to be balanced between belief and disbelief, or certitude and denial. The problem is to influence the judgment so that it will decide in favor of or against the proposition. Proof or Confirmation is the process of determining the conviction one way or the other, and of removing the balance or doubt so that some degree of assent or denial, whether of belief or knowledge, will follow as a consequence. The process is effected in various ways as the kinds of proof will show.

One important point in the nature of proof must not be neglected. It is somewhat different from inference, though it is reasoning. Inference properly proceeds from premises to conclusion; proof proceeds from conclusion to premises. Proof assumes that a proposition is first asserted or stated and then established. In inference the premises are given and the conclusion is found, but in proof the conclusion is given and the premises found for establishing it. This is clearly illustrated by the process of debating where the issue is first defined and then proved. We state our proposition as a fact, and then, assuming that it is doubted by others, proceed to find the premises, or propositions, which include it and which enforce conviction upon the doubter. Proof is, therefore, technically speaking, a process the reverse of inference, though it succeeds in establish-

ing the same fact, inference being the process for finding it.

2d. **Kinds of Proof.** — The kinds of proof or argumentation assume two general forms, *Direct* and *Indirect*, and each of these may be subdivided into two forms. Direct proof or argumentation consists in the attempt to establish a given proposition; indirect proof consists in refuting objections to it. Each of these may be divided into *deductive* and *inductive* argumentation, and as the method of arranging the data for proof or disproof is the same in both the direct and the indirect forms of it, there will be little necessity for dwelling at any length on these general divisions. It will suffice to illustrate direct and indirect proof.

A case of direct proof is found deductively in the proposition demonstrating that the angles of a triangle are equal to two right angles, or inferring that the ancestors of land crabs were once marine crabs from the existence of intermediate and amphibious species. Here consistent and pertinent matter is mentioned in which the conclusion is contained, or which suggests it as probable. A case of indirect proof of the same propositions would be the *reductio ad absurdum* of the contradictory proposition of the first instance, and a removal of apparent contradictions in the second instance. Thus, if to disprove the marine ancestry of land crabs it be asserted that the one is physiologically constructed to live in water and the other is not, we should effectively remove the force of this objection to the original assertion

by showing that to-day there are species of animals which are born and live for a period in the water, and afterward live on land. This is a case of indirect proof by removing objections.

The general method of deductive proof is explained in the discussion of deductive reasoning. All that remains to be remarked here is that it is to be resorted to whenever we wish to give certitude to the proposition asserted. In choosing our premises and facts, therefore, we must be careful to select those which really include the conclusions. Any other procedure will involve one of the formal or material fallacies. Thus, if the thesis to be proven is that "The punishment of Socrates was unjust," my premises must be stated so as to include this as an instance. I can assume that the punishment of innocent men is unjust, and then prove that Socrates was an innocent and righteous man. But if my major premise be "Most wise men should be exempt from punishment," the proof would be impossible. The proof, therefore, when demonstration is to be attained, must represent the conclusion as clearly comprehended in the premises.

In inductive proof this requirement is not imperative. The conclusion is only probable and represents a preference in this respect over the alternative course. Hence, it is sufficient to show that the conclusion is enough like or connected with other facts to be probably included in them in regard to the matter at issue. Thus, if I find a man dishonest in a certain number of transactions, I may expect to find him so in the future or in

other transactions. This is not a necessary consequence, but only a probable one. In an argument, therefore, we must be careful to distinguish between this kind of proof and the deductive process. We must see that we are not confusing the inductive with the deductive proof. Otherwise we are liable to a charge of fallacy. If we recognize that our proof is inductive, the argument against us must be inductive, unless the contradictory of our proposition can be deductively proved, in which case inductive evidence of our thesis is impossible.

II. **PROCESS OF PROOF OR ARGUMENT.**—There is always a definite order of events in the proper presentation of proof. We have to remember that the object is to convince, and not merely to please. But to effect this end we should not plunge into a debate without knowing what both the nature and the compass of the issue is. The presentation of arguments is the final stage of the process in producing conviction. The first thing is to make the issue clear. Then we have to show how much ground it covers. Finally, we have to present the proofs. These three processes may be called *Definition*, *Division* or *Analysis*, and *Probation*. Each will come up in order for treatment.

1st. **Definition.**—In an argument definition is the process of determining the nature of the issue or thesis to be proved or disproved. The thesis will be some proposition for or against which arguments are to be produced. But before the arguments can be seen to have pertinency we must

know exactly what is to be proved or disputed. Propositions are often equivocal, and only careful definition can make clear what is to be defended or opposed. Thus, in the simple proposition "Man is mortal," there may be a doubt about the issue. Whether the predicate "mortal" is to be affirmed or denied of the subject will depend as much upon what we mean by the subject "man" as upon the nature of the predicate. The issue here is the connection between the subject and predicate. If we define "man" as the particular animal organism which we know as having certain qualities, our proposition will mean one thing. If we define the term as the abstract subject of consciousness without reference to the animal organism, our proposition will mean another. Again, if "man" means the race of individual organisms, the proposition will mean still another thing. Our arguments must be different for each aspect of the question. It is so with every thesis. Take again the proposition "Protection is beneficial to the country." Here the first duty in determining what the issue under debate may be, is to define carefully what is meant by "protection." There is the etymological import of the term, which would be rejected here as not indicating specifically enough what was meant. Then there is the broad conception of prevention of any kind of injury to citizens, which would define the object of all civil laws. This might not be the issue intended. Then there is lastly the economic policy of taxing certain imports for the benefit of the producer. This conception would indicate the

issue usually understood by such a proposition This illustrates a definition of the subject. But the predicate equally demands definition in many, if not all, cases. We must make clear what we mean by "beneficial to the country." We must indicate whether the issue regards economic or moral benefits, or both. The arguments will be very much affected by this distinction. But in all cases we must make the issue clear by definition in order to prepare the mind for estimating the pertinence of the argument, as well as for enabling the debater himself to select pertinent and valid proofs. The rules for determining the definition have been given already in their proper place.

2d. **Analysis.**—Analysis or division is the process of showing how many specific and different aspects of an issue are involved in it and which can be separated for distinct treatment. The process recognizes a classification and logical order for the several arguments to be produced. It may also be defined as the process of supplying the *topics* for the discourse or argument. Suppose we have the thesis "Literature civilizes man." The analysis into topics may extend to both the subject and the predicate. We simply apply the principles of division to each term in order to determine the several topics or aspects of the issue.

The importance of this process after definition is that it enables the debater to discuss a part of his theme at a time, and not expose the whole of it to attacks that may be based upon its general and abstract meaning. Thus, if we divide "liter-

ature" into its various form to speil "scientific, philosophic, historical, etc., or other forms, we can select one division at a time for probation, in which it may be easier to establish the claim asserted than in some other case, and in this way we can produce at least a presumption in favor of others. Hence, in trying to show that "Literature civilizes man," we can divide the subject first into a series of topics. Thus, we could have the proposition "Polite literature civilizes man," and again subdivide "polite literature" into prose and poetry, and each of these into its further subdivisions, so as to bring out the merits and influence of each in the process of civilization. Then we could proceed to show that "Scientific literature civilizes man," and also resort to various subdivisions here. But the nature of the influence of scientific thought is different from that of polite literature. It affects the interests and character of men in a different way. Hence, it is convenient to separate the treatment of the one aspect of the issue from the other. It will be the same with the other two divisions, "philosophic" and "historical literature." Similarly a series of topics may be deduced from an analysis of the predicate. We may divide the civilizing process into "the elevation of artistic literary taste," "the refinement of manners," "the extension of knowledge," "the improvement of morals," etc. All of these may be regarded as processes in civilization, and we have to show that literature either in its parts or as a whole does or does not accomplish these results. In this way we give a variety of as-

pects to the issue, and prepare the mind to estimate it more clearly while the discourse may be more logical and effective.

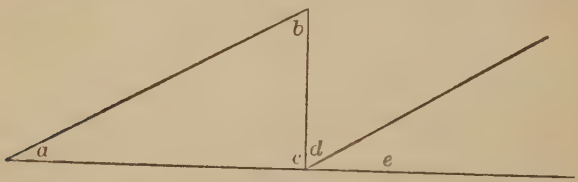
The process just illustrated is that of division. But a thesis or subject may be analyzed into topics by partition. This process has already been explained. It names the properties connected by a conception or theme. Hence, we may supply the aspects of an issue in argument by partition either of subject and predicate, or the proposition as a whole, as well as by division. Thus, if we have the thesis "Monarchy is the best form of government," we may analyze the issue by partition so as to show what has to be sustained or disproven in the following manner. For the thesis we might fix on the several characteristics that define monarchy as a government: (1) The simplicity of monarchy; (2) The efficiency of monarchy; (3) The venerable nature of its power; (4) The influence of monarchy upon science and art, etc., to almost any extent we might please. Against the thesis we might produce counter characteristics: (1) The irresponsibility of its power; (2) The tendency to nepotism; (3) Its historical habit of interfering with human liberty; (4) Its inadjustability to social and economic progress, etc.

All themes or issues can be analyzed in this way, and the value of the process is simply that which has already been indicated; namely, the distinction and logical classification of arguments so as to aid the mind in the formation of its convictions and the systematization of its ideas. The next process is Probation.

3d. **Probation.** — Probation is the process of proof, the statement and arrangement of facts and truths which will establish belief or knowledge in regard to the proposition at issue, or the contrary. The thesis or issue is the proposition to be proved or disproved. The truths which prove or disprove it are the known facts and principles which may constitute the premises, and the thesis will be the conclusion. These determining truths may be axioms, postulates, proved propositions, or any truth or fact which the person to whom the probation is presented may accept. Their acceptance is the condition of their proving or disproving anything. We must observe, therefore, that probation, as here discussed, is a material as well as a formal process. The object in proof is, not merely to have correct reasoning, but also to have correct and true propositions. We must, therefore, enunciate some facts or principles accepted by the person to whom the probation is presented, and then bring the thesis or issue under it in such a way as to enforce conviction, or at least make it the most probable alternative. As thus defined, however, there are two general types of this probation which we may consider. They are the *Deductive* and the *Inductive* arguments.

1. *Deductive Arguments.*—These are arguments that endeavor to give perfect certitude to the proposition affirmed or denied. I give an illustration of its method from mathematics. Suppose I am asked to prove that the sum of the angles of a triangle is equal to two right angles. If now I can show either by observation or proof that the

sum of the angles of a triangle is equal to some quantity which is known or admitted immediately to be equal to two right angles, I can then draw the conclusion desired. The demand and the attempt to give proof assumes that the proposition cannot be immediately *seen* to be true, at least in the special concrete case. Hence, I try to find some known truth in which the concrete case is evidently included. I first construct my triangle as follows:



The thing to be proved is the assertion that a + b + c = two right angles. Now we know by construction that c + d + e = two right angles. The triangle is also by construction a right-angled triangle, so that c is a right angle and also d + e make a right angle. By drawing the line, separating d and e, parallel with the hypothenuse of the triangle, we make b = d and a = e, according to a proposition in geometry here assumed. The argument then takes the following form:

c + d + e = two right angles.
a + b + c = c + d + e.
∴ a + b + c = two right angles.

He who admits the two premises must thus admit the proposition which was to be proved. It is the same with any other proposition, such as

"Democracy is the proper form of government." If it is to be proved, its identity or inclusion in some other admitted proposition must be seen; that is, we must see that it follows from some other known fact.

There are no special subdivisions of this form of argument except the categorical, the hypothetical, and the disjunctive syllogism. These have already been explained, and it remains only to mention certain advantages which one or two of them may have over others. The disjunctive syllogism has the value of confining the issue when the debater is careful to observe the demand for complete disjunction. The hypothetical argument has the advantage of getting the conclusion admitted on the condition that the minor premise is proved. It designs, therefore, to limit the duty of proof to the minor premise by getting consideration for the major premise without committing the affirmative to a categorical assertion of it. It is the connection between it and the conclusion that is to be gained with a reservation for the minor premise which has probably to be proved, and which, as representing a simple matter of fact, may be easy of proof. Hence, there are situations in which these forms of argument are preferable to the categorical; but the debater must use his own insight as to the proper emergencies for the application of them. Disproof, of course, employs the same method, and only tries to establish a contrary or contradictory proposition.

2. *Inductive Arguments.*—There are arguments that endeavor to show why the conclusion is

preferable to any other supposition. They should always be recognized as such by the person presenting them, if he wishes to escape the charge of certain formal and material fallacies. (The inductive argument consists in the statement of the facts which suggest the rationality of the conclusion.) Suppose the thesis is to maintain that the earth moves around the sun. When Copernicus advanced this doctrine he had only an inductive argument to favor it. This consisted in a few simple facts which his theory would explain, but which did not appear to necessitate it. They were first the facts that night and day and the seasons were as consistent with his conception as with the Ptolemaic, while the apparent retrograde motions of the heavenly bodies were more simply explained by his than by the opposing doctrine. In the course of time the case was taken as proved, but at first all that could be asserted was that *some* facts suggested it and made it possible or probable. Or again, A is bitten by a cobra, and the inference is that he will die. Now, if I can assume as certain that *all* who are bitten by the cobra must die, the reasoning would be deductive. But it may be that all my knowledge in the case is limited to the fact that *some* who have been bitten by the cobra die. Instead, therefore, of having deductive proof, I have only the inductive. It will stand as follows:

Some (X. Y. Z.) bitten by the cobra die.
A is bitten by the cobra.
∴ A will die.

Here the conclusion can only be probable in so far as the premises are concerned, and the man who relies upon this method of proof escapes the necessity of proving the *universality* of the major premise, and requires only to show a sufficient number of actual facts either easily provable or readily admitted in order to give at least some possibility to the thesis to be established, provided, of course, that he observes the material conditions for inference of any kind. Many propositions, perhaps, are capable only of inductive proof, and the proper sagacity must be shown in deciding this matter.

III. **CLASSIFICATION AND ARRANGEMENT OF ARGUMENTS.**—The deductive and inductive arguments which have been discussed assume various forms according to the purpose which they are made to serve. But they are not classified according to the form of the reasoning. They are considered from the kind of force or cogency which they represent in producing conviction. As to the arrangement of them, there must be some conception of the special situation before any rules can be laid down absolutely about it. The general principle is that the order of arguments must depend upon the state of the mind or minds addressed and the order of dependence in the proofs. Hence, we may lay down two general rules which determine the order of stating arguments, and which will be considered after classifying the kinds of arguments.

1st. **Forms of Argument.** — Here we have to do, not with merely formal processes, but with

certain material aspects and relations of facts and truths which give rise to interest and conviction. They may be classified as follows :

1. *Analytic Arguments.*—These are merely the analysis and presentation of what the very conception of the thesis and its terms involves. It partakes usually of the nature, or at least the certitude, of deduction, and also of definition. Rather it represents an analysis of all that is implied in the contents of definition. For instance, suppose the issue is "Protection is inexpedient." After defining protection as a tax on goods not produced by a country in order to encourage such production, it may be seen that such a tax involves in its very conception a discrimination against unprotected consumers, and therefore inexpedient or even unjust. This conclusion is the result of mere analysis, or inference from the conceptions in the thesis as premises.

2. *Synthetic Arguments.*—Analytic arguments are of the nature of deductions or inferences from the ideas contained in or implied by the thesis itself. But synthetic arguments are of the nature of regressive proof, going back to premises containing the thesis as a conclusion. It is thus a process of finding a truth containing the proposition to be proved, and enough more usually to make it true, whatever we may think of the proposition at stake. Thus, in the thesis "Protection is inexpedient," we should seek the assertion of some general and unquestionable truth, such as "Any policy which favors one class at the expense of another is inexpedient." This is a major premise

which will gain easy admission, or impose a heavy task upon an opponent to refute it, and hence it leaves the affirmative the easier task of proving that the minor premise is contained in it as the necessary link in the chain leading to the conclusion. The synthetic feature in it is the fact that the thesis seems to be or is a necessary consequence of two or more independent, or apparently independent, truths. It is deductive in its nature, as it has been illustrated; but it is not deductive in the sense that it starts from definition and merely shows that the proposition is a consequence of that definition, but it is deductive only in the sense that it necessarily follows from two premises mediated by the third term and is included in them. But the synthetic argument involves the difficulty of making good the assertion of truths that contain something more comprehensive than the particular conclusion at issue. It is possible also to give the synthetic argument an inductive character. It becomes so according to the nature of the premises.

3. *Argument from Antecedent Possibility.*—This argument is sometimes called antecedent probability, but antecedent possibility is better. It means the argument which shows that there is nothing opposed to the supposition under discussion. It may be considered a form of indirect argument. It proves that it is not against reason to suppose the apriori possibility of the proposition, and leaves to other positive evidence the proof of the proposition as a fact. Suppose the issue is whether there is any immaterial substance

or not. It is an antecedent possibility to show that the conception of such a reality does not contradict any known reality. It is not the slightest evidence of the fact. No such immaterial reality may exist as a fact. But it is no reason to deny it that there is no positive evidence for it. Hence, wherever there is a tendency to deny the existence of something on the ground of the want of evidence, it is a defence of its possibility to show that no facts stand in the way of supposing it, so that positive belief or conviction only awaits evidence. In regard to the particular instance before us, this argument for antecedent possibility consists in showing that the known facts, or the limits of positive knowledge only extend to the denial of evidence for immaterial substance, and not to the denial of its existence. The error, of course, in assuming the latter on the ground of the former, has its counter error in the assumption of its existence because it cannot be positively denied. But we must be as careful to avoid this use of the argument as we are desirous of impeaching the opposite side for committing the counter error. We must be careful to show that the argument is only indirect, and not direct.

One form of this argument for antecedent possibility is the so-called argument from *Analogy*, which is based upon the resemblance of *relations* rather than upon the resemblance of *properties* between things. For instance, the argument from the habitation of the earth to the habitation of other planets is one of analogy; or again, from the metamorphosis of the butterfly to immortality.

These arguments are often taken for real ones, but in so far as they are arguments at all they are only indirect and of a weak kind even at that. In fact, it might be possible to maintain that the chief, if not the only, function of analogy is to *define* a conception or issue. But there are probably uses of it where it avails to establish an antecedent possibility, though it can do no more than this.

4. *Argument from Circumstantial Evidence.* — This is a form of inductive and synthetic proof, and is that form of argument which endeavors to prove a thesis by the presence of certain signs or incidents which suggest it. For instance, I have to show that light has velocity. If I can point to the phenomenon or fact that there is a difference of time in the observation of the eclipses of certain satellites, determined by the position of the earth in its orbit, I may safely maintain that my thesis has some probability. If I can collect a number of concurrent facts, I strengthen that probability. A still better instance is the following: A man is charged with murder. We wish to prove the accusation. We find certain characteristics in the boot-tracks going away from the murdered person. If we find that the boots of the accused correspond exactly to these characteristics, we have at least presumptive evidence of his guilt. If, further, we find that the accused possesses bullets or slugs like those found in the body of the murdered person, we have corroborative circumstantial evidence. Unless this can be of a large and cumulative amount

or of a particular quality, it does not suffice for demonstrative proof, but only establishes a certain degree of probability. It is simply an argument from certain signs, marks, characteristics, coincidences, etc., to the probability that a given thesis is true. Whenever we argue from any given attribute or phenomenon to an unknown cause, we in fact employ the argument from circumstantial evidence, though the phrase is usually limited to legal situations and problems, where the data from which the inference is drawn are not usually, if ever, attributes of anything, but events and facts apparently independent of the thing to be proved.

5. *Personal Argument.*—This argument may be regarded as a form of circumstantial evidence, though it is not what we should call the *ad rem* argument, but what I should technically call the *argumentum ad personam.* So far as the real issue is concerned, this class of arguments is comprised in that which I have called the *evasio dictionis*, and includes the *argumentum ad judicium*, *argumentum ad populum*, *argumentum ad hominem*, etc. These, we have shown, may be legitimate if they are directed to produce *conviction*, but not for *proving the truth.* In debate or argumentative discourse the first object is to produce conviction ; that is, agreement or disagreement in regard to the issue, and the material truth must then depend upon other processes than mere reasoning. In order that one side or the other may thus establish this result, it is necessary that each shall be allowed to present a form of argument that involves the other in the

conclusion which the latter denies. This is a way of indicating that the truth lies on the side of consistency, only it does not finally decide upon which side the consistency lies. If, for instance, the issue is "The appointing power of the executive should be increased," and the affirmative quotes A as an authority in his favor, it is perfectly pertinent for the negative to quote in reply the same authority for facts which contradict this conclusion. This is an *ad hominem* argument against the affirmative, and requires either the abandonment of his authority or the acceptance of the negative's conclusion. In the appeal to universal consent, or to the convictions of the audience, there is the effort to present facts with some presumptive weight in the conclusion to be sustained. It is the same with the *argumentum ad verecundiam.* But the authority to which appeal is made in this case must be recognized by the opponent.

6. *Argument from Testimony.*—This is a form of argument based upon the credibility of a witness to real or alleged facts. The facts are circumstantial evidence of the thesis, and the character of the witness is the measure of the weight attaching to his testimony on the facts. "The degree of weight to be attributed to testimony is always to be estimated by this view of the nature of testimony—that it is a sign, implying the facts to which it testifies as more or less necessary conditions of its having been given. Whenever, therefore, occasions or motives exist in the case for giving the testimony other than the truth, the credibility of the witness will be so far impaired.

We are thus to judge of the credibility of historians. The historian of a sect or of a party must be received as a credible witness only so far as it may appear that truth was the condition of his speaking as he does. All admissions against his own sect or party, unless made as baits or lures, will be received as honest testimony. If these qualifications are wanting, there is nothing on which testimony can rest." But where honesty and candor, as well as good judgment, exist, the facts attested will have all the weight of these qualities, though this may not be so great as in the case that the facts are personally known by the disputants.

This argument from testimony takes two forms : (1) Testimony in regard to *facts*, and (2) Testimony representing matters of *opinion*. The latter involves the results of judgment and inference, and the former does not go beyond matters of perception, in which more people are competent to pronounce than in matters involving interpretation and inference. The second form is sometimes called "expert evidence." It means to accept the judgment of qualified men where common experience is not a guide.

2d. **Arrangement of Arguments.**—The general principles which regulate the order of stating the arguments are two. They are : (1) The state of the mind addressed ; (2) The dependence of the arguments upon each other.

" If the mind addressed be already in a state of belief, and the object of the discourse is to confirm and strengthen it, then the weaker arguments

may generally need to be placed first, and the stronger ones last. But if there be an opposing belief to be set aside, it will be better to advance the stronger first, in order to overthrow opposition at once. The weaker may follow, which will confirm when they would be of no avail in the first assault. In order to leave a strong impression, however, some of the stronger arguments may be reserved for the close; or what is equivalent, the arguments may be recapitulated in the reverse order."

When it comes to the consideration of the second principle, which disregards the state of mind addressed, we have an order that may not represent the order of strength in producing conviction, but an order in which the strength itself may be affected by what goes before. The succeeding arguments are supposed to receive additional weight from the cogency of the preceding. Other things being equal, therefore we have the following rules:

(1) Deductive should precede inductive proofs. This assumes that they are both applicable to the issue. In case that only one of them is possible, this rule does not apply, and in case that the state of mind is already one of belief, the order should be reversed. Those also who maintain that induction conditions deduction might adopt the reverse of this order.

(2) Analytic proofs should precede the synthetic and all others. The reason for this rule is that the analytic argument naturally follows the process of definition, and prepares the way for

the reference to general principles or particular facts antecedent to the proposition stating the issue, while the analytic argument does not go behind the conceptions which define this issue.

(3) Antecedent possibility arguments should precede the inductive arguments generally and those from circumstantial evidence in particular. If any presumption against the possibility of the thesis exists, the first thing is to get that out of the way, and the mind is then receptive for the others.

But there are no hard-and-fast rules to be followed for every thesis. The judgment of the debater must be used first to gauge the situation and to adopt the best arrangement to suit it with a general reference to the rules just mentioned. The debater must decide in each particular case both the state of mind addressed and the propriety of using the cumulative method of argument. In all cases, however, no matter what the technical name given to the kind of argument, the cumulative argument has great value and weight. This is the successive presentation of arguments that grow in cogency and power, and the order will depend somewhat upon circumstances. The order here will be first antecedent possibility, testimony, circumstantial evidence, personal argument, and deduction. This procedure must or ought to be concluded by a recapitulation which sums up in outline all the arguments that have been presented. Just as definition introduces discourse, recapitulation should close it.

QUESTIONS AND EXAMPLES

CHAPTER I

INTRODUCTION

1. Define Logic, and show when it is a science and when an art.

2. Define Rhetoric, and show its relation to Logic.

3. Explain the various meanings of the term "law," and more especially its usage in Logic.

4. What is the meaning of the term "thought?"

5. Name the prelogical processes.

6. Define the logical processes, and state the common characteristic of all of them. What is the distinction between perceiving and apperceiving?

7. What is the name of the two kinds of Conceptions, and what do they mean?

8. Define Judgment and Reasoning, and distinguish between them.

9. What are the divisions of Idea-expression?

10. Define a "theme," and the processes of Explanation and Confirmation.

11. What is meant by "analysis" and "synthesis" in Discourse?

CHAPTER II

1. What is a Term or Concept?

2. What are Categorematic and Syncategorematic Terms?

3. Define and distinguish between Singular and General Terms.

4. Define and distinguish between Collective and Distributive Terms; also between Concrete and Abstract Terms.

5. What is the popular meaning of Abstract and Concrete Terms, and how is it distinguished from the logical and technical meaning?

6. In the following list of Terms select the various kinds of them, and explain why they are such, stating whether they are pure or mixed:

Act,	Beauty,	Man,	Ability,	Presidency,
Action,	Timeliness,	Virtue,	Excellence,	Wisdom,
Agency,	Plato,	Solitude,	Dexterity,	Government,
Agent,	Library,	Introduction,	Art,	Production,
Warmth,	Science,	Truth,	Stone,	Paper,
Society,	Personality,	Wood,	Army,	House,
Sun,	Washington,	Chair,	Nation,	Sweetness,
Some,	Bible,	History,	Koran,	Prime Minister.

7. Explain the uses of Terms in the following propositions and passages:

(*a*) The inhabitants of Germany constitute a nation.

(*b*) "All men find their own in all men's good,
And all men join in noble brotherhood."

(*c*) All standing armies are dangerous to the state.

(*d*) Non omnis moriar (*i.e.*, I shall not all die).

(*e*) All the men cannot lift this weight.

(*f*) Virtue brings its own reward.

(*g*) Society is an organism.

(*h*) All of the regiment was put to flight.

(*i*) Duty cannot be evaded when the nation issues a call to arms for the defence of its dignity and humanity. Justice and right must be secured, even if the people cannot form a united resistance to an enemy. All

the moral forces and interests of the community ought to be arrayed with the government in such an emergency, and when the country's chief ruler issues his command for action and obedience.

8. Select and explain the various uses of the following Terms, Positive, Negative, Privitive, and Nego-positive :

Tree,	Animal,	Deaf,	Inhuman,	Inconclusive,
Insensible,	Ignorant,	Peerless,	Perfect,	Unartistic,
Useful,	Impure,	Defect,	Decarnate,	Inconvenient,
Blind,	Clean,	Cold,	Dislike,	Imperishable,
Pure,	Bitter,	Naked,	Inordinate,	Uncontrollable.

9. Define and explain Infinitated, Absolute, and Relative Terms.

CHAPTER III

1. What is meant by the Predicables ?

2. What is meant by the Quantity and Quality, or Extension and Intension of Terms ?

3. Define Genus and Species. What is the relation between them ?

4. Explain the meaning of Conferentia and Differentia, and show their relation to each other.

5. Explain the meaning of Essentia and Accidentia.

6. What is the relation between Extension and Intension ?

7. What is the analysis of Concepts ? Name its forms.

8. Explain and illustrate the processes of Definition, Division, and Partition. What are the rules for each ?

9 Give a logical definition for each of the following concepts :

Biped,	Nation,	Diet,	Spirit,	Water,	Honor,
House,	Mind,	Republic,	Action,	Religion,	Imagination,
Club,	Money,	Matter,	Spectacle,	Science,	Government,
Flood.	Politics,	Poetry,	Picture,	Heat,	Gravitation.

10. Examine the following definitions :

(*a*) A chair is a thing on which men sit.
(*b*) Ink is a black liquid.
(*c*) Philosophy is knowledge.
(*d*) An animal is a thing which increases in size.
(*e*) A nation is a collective body of men.
(*f*) A triangle is a figure which is formed by the intersection of three straight lines.
(*g*) Death is the opposite of life.
(*h*) A king is one who exercises regal functions.
(*i*) A gentleman is a man who has no visible means of subsistence.
(*j*) Man is a rational animal of the highest form of development.
(*k*) Science is the study of phenomena with a view to scientific knowledge.
(*l*) Religion is a theory of divine government.
(*m*) Faith is the substance of things hoped for, the evidence of things not seen.
(*n*) Legislatures are bodies of law-makers.
(*o*) Members of the solar system are anything over which the sun exercises an influence.
(*p*) Socialism is a theory of government.

11. Apply Logical Division to the following Concepts :

Tree,	Religion,	Matter,	Quadrupeds,	Vertebrates,
Stones,	House,	Machines,	Organisms,	Literature,
Science,	Books,	Vegetables,	Churches,	Employment,
Poetry,	Laws,	Substance,	Mammals,	Societies.

12. Divide "man" according to color, language, and religion ; "government" according to constitution, territory, and race ; "houses" according to form, architecture, use, and history ; "vegetables" according to structural form, use, habitat, and history ; "language" according to form, geographical distribution ; "matter" according to density, structure, and use ; "books" according to form, subject, binding, price, age, and utility.

13. Divide each of the following concepts according to two distinct principles of division :

Law,	Occupations,	Metals,	Religion,	History,
Society,	Triangle,	Liquids,	Instruments,	Animals.

14. Analyze the following concepts by partition :

Metal,	Picture,	Cathedral,	Knowledge,	Religion,	Ink,
Iron,	Stone,	Honor,	Money,	Literature,	Book,
Plant,	House,	Water,	Virtue,	Production,	Ice,
German,	Diamond,	Vertebrate,	Sensation,	Gravitation,	Wheat.

15. Apply Partition to the following abstract conceptions so as to exhibit their qualities either of action or passion :

Politeness,	Beauty,	Comity,	Manliness,	Courtesy,
Wisdom,	Justice,	Credulity,	Purity,	Confidence,
Generosity,	Penitence,	Patriotism,	Genius,	Spirituality.

CHAPTER IV

1. Define Analysis of a theme in Discourse. What processes constitute it ?

2. What is the place of Definition in Explanatory Discourse ?

3. What are the uses of Division and Partition in the same ?

4. How is Analysis to be applied ?

5. Define Synthesis in Discourse.

6. What are the laws that regulate Synthesis or Composition ?

7. Define each of the three forms of Composition.

8. Describe the following subjects or themes according to the various classes of attributes suggested by Partition :

The Zodiac ; America ; Boston ; Mont Blanc ; Webster's Dictionary ; a tree ; a locomotive ; an electric

telegraph; a book; a diamond; the Æneid; Paradise Lost; Dante's Inferno; England: The character of Napoleon; Bismarck; Ohio; United States; Atlantic Ocean; a statesman; a philosopher; a poet; a laborer; Raphael's Madonna; a legislature.

The elephant; quadrupeds; a manufactory; store; true manhood; genius; politeness; a horse-race; plants; electricity; commerce; inflation of the currency; candor; temporal power of the Pope; civilization of the present century; a winter landscape; the medieval Church; the government of England; the Roman religion; Christianity; commerce; Greek art; political institutions.

9. Apply Narration to the following themes with analysis:

The Crusades; the American Revolution; the American Constitution; the progress of Art; the battle of Gettysburg; the French Revolution; the Life of Gladstone, of Bismarck, of Pitt; the glacial epoch; the formation of habit; the growth of a plant; a boat-race; a game of ball; a railway collision; the rise of chivalry; the slave trade; the history of Protection, of Free-trade; the growth of intelligence; currency problems in the United States; growth of the Speaker's power in Congress; American architecture, etc.

10. Apply Exposition to the following themes with analysis:

Government; religion; science; property; politics; virtue; dress; rhetoric; manners; society; art; music; painting; sculpture; personality; the Church; architecture; the Papacy; protestantism; the social contract; the Constitution; the Declaration of Independence; justice; commerce; business; law; literature; currency; magnanimity; self-reliance; poverty; civilization; democracy; empire.

CHAPTER V

1. Define a Proposition and distinguish between Univocal and Equivocal Propositions. Illustrate.

2. Define and illustrate each of the Logico-Grammatical Propositions.

3. What are the symbols of each of these propositions, and how distinguish them in respect to form and matter?

4. Define and illustrate both the Logico-Qualitative and the Logico-Quantitative Propositions.

5. How do we reduce the five-fold division of propositions into the two-fold?

6. State, define, and illustrate the divisions of Equivocal Propositions.

7. What are the symbols for each of the Equivocal Propositions, and how reduce them to the Univocal form?

8. What is meant by the Distribution of terms? What is the distribution of terms in Definitions and Exclusive Propositions?

9. Examine the following propositions and resolve them into their proper forms for definite logical use:

(*a*) Man is rational.

(*b*) All men are not wise.

(*c*) Only bipeds have hands.

(*d*) Man alone is not obedient to his instincts.

(*e*) Few elements are metals.

(*f*) Most men are Caucasians.

(*g*) Only those substances which are not subject to gravity are immaterial.

(*h*) All persons except crazy men and foreigners are not allowed to vote.

CHAPTER VI

1. What is meant by the Opposition of Propositions?

2. How do we treat *singular* and *abstract* propositions?

3. If we assume the falsity of any one of the four propositions, A, E, I, and O, what follows in regard to the others?

4. How may we disprove propositions, and which is the better form of disproof?

5. What are the laws of Opposition?

6. Select pairs of the following propositions and arrange them so as to show all the various relations illustrated by them:

(*a*) All metals are elements.
(*b*) Some metals are not elements.
(*c*) No metals are elements.
(*d*) Some metals are elements.
(*e*) Most metals are elements.
(*f*) All metals are not elements.
(*g*) Not all metals are elements.
(*h*) Only metals are elements.
(*i*) Few metals are elements.

7. Examine the relation expressed by the following propositions:

(*a*) One man says that all men are wise and another that they are all ignorant.
(*b*) Free trade lowers prices and protection does not.
(*c*) One party asserts that A will be elected president, and the other that B will be elected president.
(*d*) Mr. X asserts that not a nail was made in this country before 1861. E says that so far from this statement of X being true that in 1856 there were 2,645 nail-machines in

operation in this country with an output of 86,462 tons, and in 1859 as many as 4,686,207 pounds of nails were exported.

(*e*) Will the educated woman marry? So queried one of our alumnæ in a recent magazine article in which the object was to show that she would not. The review roll of our alumnæ shows that of 76 ladies who graduated in our classes, 32 have already married.

(*f*) The policy which he now says would have been infamous he was then proposing to adopt.

(*g*) If the appreciation of gold has been the cause of the extraordinary fall in prices, why have ivory and whalebone not fallen in price, but on the contrary have steadily risen in price during the last decade?

CHAPTER VII

1. What is the meaning of inference? Of immediate inference? Of mediate inference?

2. Name the divisions of immediate inference.

3. What are the rules for conversion? What is meant by Convertend and Converse?

4. What propositions can be converted and what not, and why?

5. Why cannot proposition I be contraverted?

6. Why are Definitions and Exclusive propositions real or apparent exceptions to these rules?

7. What is the technical meaning of the exclusive particle?

8. What is meant by Conversion by Negation?

9. What are the rules for Obversion and Contraversion?

10. How do we obvert negative propositions?

11. Define and illustrate inference by Contribution.

12. What is the difference between the two kinds of Contribution?

13. Define and explain Antithesis.

14. State the logical process by which we pass from each of the following propositions to the succeeding one:

(*a*) All oaks are trees.
(*b*) No oaks are not trees.
(*c*) No not-trees are oaks.
(*d*) All not-trees are not-oaks.
(*e*) All not-trees are not oaks.
(*f*) All oaks are not not-trees.
(*g*) All oaks are trees.
(*h*) All not-trees are not oaks.
(*i*) All not-trees are not-oaks.
(*j*) Some not-oaks are not-trees.
(*k*) Some not-oaks are not trees.
(*l*) Some oaks are trees. (*a*)
(*m*) Some trees are oaks.
(*n*) No trees are oaks.
(*o*) All trees are oaks.

15. Apply the various processes of immediate inference to the following propositions:

(*a*) Every man is a biped.
(*b*) Some books are dictionaries.
(*c*) The virtuous alone are happy.
(*d*) No triangle has one side equal to the sum of the other two.
(*e*) "Every consciousness of relation is not cognition."
(*f*) Perfect happiness is impossible.
(*g*) A stitch in time saves nine.
(*h*) None think the great unhappy but the great.
(*i*) Few are wise enough to be virtuous.
(*j*) No one is free who does not control himself.

(*k*) Good orators are not always good statesmen.
(*l*) Some inorganic substances do not contain carbon.
(*m*) Only the brave deserve the fair.
(*n*) All men are not born equal.
(*o*) No one is a hero to his valet.
(*p*) Uneasy lies the head that wears a crown.
(*q*) He jests at scars who never felt a wound.
(*r*) Better late than never.
(*s*) Every mistake is not culpable.
(*t*) I shall not all die. (*Non omnis moriar.*)
(*u*) Fain would I climb but that I fear to fall.
(*v*) Great is Diana of the Ephesians.
(*w*) Not many of the metals are brittle.
(*x*) Talents are often misused.
(*y*) Some books are to be read only in part.
(*z*) Two blacks will not make a white.
(*a'*) Not one of the Greeks at Thermopylæ escaped.
(*b'*) Nothing is praiseworthy but virtue.
(*c'*) No one is always happy.
(*d'*) There is none good but one.
(*e'*) All that glitters is not gold.
(*f'*) He can't be wrong whose life is in the right.
(*g'*) Philosophers in many instances do not escape equivocation.

16. State the relation, if any, between the following propositions as indicated by the figures in parentheses at the end of each proposition :

(1.) Good men are wise.
(2.) Unwise men are not good (1).
(3.) Some wise men are good (1).
(4.) No good men are unwise (1), (2).
(5.) Some unwise men are not good (2), (3), (4).
(6.) Some good men are wise (1), (2), (3).
(7.) No good men are wise (1), (3), (4), (6).
(8.) Some good men are not wise (1), (3), (6), (7).

(9.) No unwise men are good (1), (4), (5), (8).

(10.) No wise men are good (1), (2), (6), (7), (8).

17. What is the logical relation, if any, between the two following propositions: "A false balance is an abomination to the Lord, but a just weight is his delight."

18. State the relation between the following three propositions: "The voluntary muscles are all striped, and the unstriped are all involuntary, but a few of the involuntary muscles are striped."

19. Can we logically infer that cold contracts bodies because heat expands them?

CHAPTER VIII

1. Define mediate reasoning with its divisions.

2. Name and define the elements of the syllogism.

3. What are the chief rules for the syllogism?

4. Define what is meant by the Mood and the Figure of the syllogism.

5. Show by the rules what Moods must be rejected from the whole sixty-four on the ground of being fallacious in all cases.

6. What kind of conclusion can be drawn from the following premises, AA, EA, IA, AE, OA, EI?

7. What is meant by a weakened conclusion?

8. Show in what Figures the following premises give valid conclusion: AA, AE, IA, EA, AO, EI, AI, OA.

9. Why must the major premise of the first Figure be universal?

10. Why must one of the premises in the second Figure be negative?

11. Show that O cannot stand as either premise in the first Figure, as major premise in the second Figure, and as minor premise in the third Figure.

12. What fallacy will be committed by having A as a conclusion in any figure but the first?

13. What fallacy is committed when the minor premise is negative in the first and third Figures?

14. If one premise be O, what must the other be?

15. Why cannot the premises be IE?

16. Why can no universal conclusion be drawn in the third Figure?

17. Could you reason with affirmative propositions in the second Figure if one of the premises is a definition?

18. How can you treat premises in IE in order to get a valid conclusion?

19. If my conclusion be O, what are my premises?

20. If the minor premise be affirmative, what moods will give a valid conclusion?

21. State the Moods and Figures of the following syllogisms, and name those which are valid and those which are invalid:

(*a*) Some M is P.
No S is M.
∴ Some P is not S.

(*b*) All P is M.
No M is S.
∴ No P is S.

(*c*) All S is M.
No P is M.
∴ Some S is not P.

(*d*) No M is P.
All M is S.
∴ Some S is not P.

(*e*) Some P is M.
All S is P.
∴ Some S is M.

(*f*) All P is M.
Some M is not S.
∴ Some P is not S.

(*g*) Some M is not S.
Some P is not S.

22. With E as a middle term, form a syllogism with C as the predicate of the conclusion.

23. How can you reduce one Figure of the syllogism to another?

24. What is the value of each Figure of the syllogism?

25. Examine the following syllogisms:

(*a*) All feathered animals are vertebrates.
No reptiles are feathered animals.
∴ Some reptiles are not vertebrates.

(*b*) All vices are reprehensible.
Emulation is not reprehensible.
∴ Emulation is not a vice.

(*c*) All men are rational beings.
All Caucasians are rational beings.
∴ All Caucasians are men.

(*d*) All vices are reprehensible.
Emulation is not a vice.
∴ Emulation is not reprehensible.

(*e*) Some men are wise.
All philosophers are men.
∴ Some philosophers are wise.

(*f*) Some animals are quadrupeds.
All trees are not quadrupeds.
∴ Some trees are not animals.

(*g*) Only citizens are voters.
A B C are voters.
∴ A B C are citizens.

(*h*) Some statesmen are wise.
Some good men are statesmen.
∴ Some good men are wise.

(*i*) Some plants are deciduous.
No trees are plants.
∴ Some trees are not deciduous.

26. Deduce conclusions, stating Moods and Figures, from the following premises :

(*a*) All planets are heavenly bodies.
No planets are self-luminous.

(*b*) All Europeans are Caucasians.
All Caucasians are white.

(*c*) All lions are carnivora.
All carnivora are devoid of claws.

(*d*) Some animals are quadrupeds.
All quadrupeds are vertebrates.

(*e*) Oak trees are evergreen.
Pine trees are evergreen.

(*f*) Some Americans are not white.
All white persons are Caucasian.

CHAPTER IX

1. Define each form of simple and complex syllogism or reasoning.

2. How can the enthymeme be completed to form a syllogism?

3. What are the conditions of a valid sorites?

(*a*) Europeans are Caucasians because they are white.

(*b*) We cannot know what is false because knowledge cannot be deceptive.

(*c*) I am at liberty to do as I please, since he did not deliver the message.

(*d*) A is B because it is C.

(*e*) A is B because C is B.
E is A because C is A.
E is A.

(*f*) A manor cannot begin at this day, because a court baron cannot now be founded.

CHAPTER X

1. What is the difference between categorical and hypothetical reasoning?

2. Define each kind of hypothetical reasoning.

3. Give the rules for valid hypothetical reasoning.

4. To what in the categorical syllogism are the moods of hypothetical reasoning equivalent?

5. What characterizes simple and complex dilemmatic reasoning?

6. How can hypothetical reasoning be reduced to categorical?

7. Examine the following instances of hypothetical reasoning, state the moods and convert into categorical syllogisms:

(*a*) If education is necessary it will be popular. It is popular, and therefore will be necessary.

(*b*) Rain has fallen if the ground is wet; but the ground is not wet; and therefore rain has not fallen.

(*c*) If the citizens would reform themselves their government might be improved; but the citizens will not change their character, and hence no improvement in their government can be expected.

(*d*) If rain has fallen the ground is wet; but rain has not fallen, and therefore the ground is not wet.

(*e*) If the weather is cloudy it will not be warm: but it is warm, and therefore is not cloudy.

(*f*) If food is not scarce the wants of the community are satisfied; but food is not scarce and hence the wants of the community are satisfied.

(*g*) The ground is wet if rain has fallen; the ground is wet; therefore rain has fallen.

(*h*) If citizens do not obey the law, they will not retain their freedom; but they obey the law and hence retain their freedom.

(*i*) If the ground is wet rain has fallen. But rain has fallen; therefore the ground is wet.

(*j*) If a man cannot make progress toward perfection, he must be a brute; but no man is a brute, and therefore is capable of such progress.

(*k*) If two and two make five in some other planet, Mill's opinion about the matter is correct; but they do not make five in any place, and hence Mill is wrong.

CHAPTER XI

1. Define and illustrate disjunctive reasoning.

2. Explain the uses of the symbols of disjunctive propositions.

3. Name and define the two moods of disjunctive reasoning.

4. Upon what does incomplete disjunction depend?

5. What fallacy characterizes disjunctive reasoning?

6. Examine the following instances of disjunctive reasoning, and resolve into both hypothetical and categorical syllogisms:

(*a*) Criminals are either good or bad.
They are bad.
They are not good.

(*b*) The weather will be either clear or warm.
It will not be warm.
It will be clear.

(*c*) A is either B or C.
A is not B.
A is C.

(*d*) Aristotle was either very talented or very industrious.
He was very industrious.
He was not very talented.

CHAPTER XII

1. Give the definition and divisions of the several kinds of fallacy.

2. What determines the existence of formal fallacies?

3. How do we classify the material fallacies?

4. Define and distinguish between the two kinds of fallacy based upon equivocation.

5. Define and illustrate the fallacies of *petitio principii* and *non sequitur*.

6. What are the legitimate uses of the *argumenta ad judicium*, *ad populum*, etc?

7. Explain several points of view from which fallacious reasoning can be considered.

CHAPTER XIII

1. Define inductive reasoning. Distinguish between Perfect and Imperfect Induction.

2. How do you distinguish between Deduction and Induction?

3. What is the difference between the formal process in the two kinds of reasoning?

4. What are the rules for inductive reasoning?

CHAPTER XIV

1. Define what is meant by proof and its two kinds.

2. What is the difference between proof and inference?

3. What is the difference between direct and indirect proof?

4. Name and define the various processes involved in proof.

5. How should arguments be classified in logical discourse?

6. What is meant by analytic and synthetic arguments?

7. Explain the nature of Personal Arguments.

8. What should be the arrangement of arguments?

9. Apply argumentation with analysis to the following themes, choosing according to conviction or convenience whether it shall be proof or disproof:

The benefits of the Crusades. The execution of Charles the First. The punishment of Socrates. The policy of protection. The policy of free trade. The

merits of the classics. Co-education. The freedom of the press. College athletics. The benefits or evils of feudalism. The character of Aaron Burr. The banishment of Napoleon. The execution of the Duc d'Enghien. The Hispano-American war. Civil-service reform. Universal suffrage. States rights. The Peloponnesian war. Lynch law. Strikes. Boycotting. The necessity of labor unions. Free education. Trusts. Political bosses.

The instructor may find it best to supply subjects of current interest.

PRACTICAL EXERCISES

DEDUCTIVE

1. Personal deformity is an affliction of nature.
   Disgrace is not an affliction of nature.
   Therefore personal deformity is not a disgrace.
2. None but animals are quadrupeds.
   Horses are quadrupeds.
   Therefore horses are animals.
3. All roses are beautiful.
   Lilies are not roses.
   Therefore lilies are not beautiful.
4. Every book is liable to error.
   Every book is a human production.
   Therefore all human productions are liable to error.
5. All paper is useful; and as all that is useful to men is a source of comfort to them, therefore, all paper is a source of comfort to them.
6. Some statesmen are also authors; for such are Burke, Macaulay, Gladstone, Lord Russell, etc.
7. Some philosophers are logicians.
   No logicians are ignorant of the works of Aristotle.
   Therefore some philosophers are not ignorant of the works of Aristotle.

8. No persons destitute of imagination are true poets.

Some persons destitute of imagination are good logicians.

Therefore some true poets are not good logicians.

9. If Cæsar was a tyrant he deserved to die.

Cæsar was not a tyrant.

Therefore he did not deserve to die.

10. Good is the object of moral approbation. The highest good is, therefore, the ultimate object of such approbation.

11. If it stops raining the weather will be colder.

The weather will be colder.

Therefore it will stop raining.

12. It is doubtful whether Cæsar will come forth to-day or not.

For he is superstitious grown of late.

13. Every man should be moderate; for excess will cause disease.

14. All Parisians are Frenchmen.

No Chinese are Parisians.

Therefore some Chinese are not Frenchmen.

15. Some men are not virtuous.

All Americans are men.

Therefore some Americans are not virtuous.

16. Blessed are the merciful; for they shall obtain mercy.

17. As almost all the organs of the body have a known use, the spleen must have some use.

18. Some of the inhabitants of the globe are more civilized than others.

No savages are more civilized than others.

Therefore, some savages are not inhabitants of the globe.

19. *Cogito ergo sum* (I think, therefore, I am).

20. He must be a Mohammedan, for all Mohammedans hold these opinions.

21. He must be a Christian, for only Christians hold these opinions.

22. Logic is either a science or an art.
It is a science.
Therefore, it is not an art.

23. No idle person can be a successful writer of history; therefore, Hume, Macaulay, Hallam, and Grote must have been industrious.

24. Every moral man obeys the law; every citizen does not do so, and therefore is not moral.

25. This explosion must have been occasioned by gunpowder; for only gunpowder had a sufficient force.

26. Rational beings are accountable for their conduct; brutes not being rational are exempt from responsibility.

27. All valid syllogisms have three terms.
This syllogism has three terms.
Therefore, this syllogism is valid.

28. All syllogisms are valid that have three terms.
This syllogism has three terms.
Therefore, this syllogism is valid.

29. Comets are heavy matter: for otherwise they would not obey gravitation.

30. A charitable man has no merit in relieving distress, because he merely does what is pleasing to himself.

31. If the government enacts such a law it must either adopt socialism or go into bankruptcy. But it will not enact such a law, and hence there is no danger of either socialism or bankruptcy.

32. None but savages were in America when it was discovered.
The Hottentots were savages.
Therefore, they were in America when it was discovered.

33. None but despots possess absolute power.
The Czar of Russia is a despot.
Therefore, he possesses absolute power.

34. Bacon was a great philosopher and statesman, and he was also a lawyer; we may infer that any lawyer may be a great philosopher and statesman.

35. Mathematical studies undoubtedly improve the reasoning powers; but as logic is not a mathematical study we may conclude that it does not improve our reasoning powers.

36. If a man cannot obey the law he must be either a machine or a demon; but no man is either of these, and hence he must be able to obey the law.

37. Whatever tends to draw the mind from pursuits of a low nature deserves to be promoted. Classical learning does this, since it gives us a taste for intellectual enjoyments: therefore, it deserves to be promoted.

38. If virtue is involuntary, vice is involuntary.
Vice is voluntary.
Therefore, virtue is voluntary.

39. All civilized people are inhabitants of the temperate zones. Few Indians are civilized, and therefore few Indians are inhabitants of the temperate zones.

40. If pain is severe it will be brief, and if it last long it will be slight; it is either severe or it lasts long, and therefore will be either brief or slight.

41. Some who are truly wise are not learned; but the virtuous alone are truly wise; the learned, therefore, are not always virtuous.

FORMAL AND MATERIAL

42. The Americans are a nation, and as the citizens of New York City are Americans, they must be a nation.

43. The right should be enforced by law. Hence, since the exercise of the suffrage is a right, it should be enforced by law.

44. Napoleon was not a great emperor; for though he would have been great had he succeeded in retaining power, he did not do so.

45. Seven and nine are odd numbers.
Sixteen is seven and nine.
Therefore sixteen is an odd number.

46. If capital punishment involves cruelty to its victims it ought to be abolished in favor of some other penalty; if it does no good to society it should also be abolished. But it either involves cruelty to its victims or does no good to society, and hence it ought to be abolished.

47. The Reformers were strongly opposed to the papal supremacy, and as Mr. B. was a reformer, because he favored better politics, he was opposed to the papal supremacy.

48. Knowledge is of no use to anyone in preventing him from committing crime; for we hear every day of frauds and forgeries which would have never been committed had not the person learned to read and write.

49. Wealth is valuable; value is purchasing power; purchasing power is the product of labor, and the product of labor is property; therefore, wealth is property.

50. Every rule has exceptions; this is a rule, and therefore has exceptions; therefore, there are some rules that have no exceptions.

51. All who think this man innocent think he should not be punished; you think he should not be punished; therefore, you think him innocent.

52. All who think this man innocent think he should not be punished; you think he should be punished; therefore, you do not think him innocent.

53. The end of punishment is either the protection of society or the reformation of the criminal. Capital punishment ought, therefore, to be abolished, because it neither prevents crimes of violence, nor protects society, nor does it reform the criminal.

54. Haste makes waste, and waste makes want. A man, therefore, never loses by delay.

55. Only the virtuous are truly noble; some who are

called noble are not virtuous; therefore, some who are called noble are not truly noble.

56. All equilateral triangles are equiangular, and therefore, all equiangular triangles are equilateral.

57. For those bent on cultivating their minds by diligent study the incitement of academic honors is unnecessary; and it is ineffectual for the idle and such as are indifferent to mental improvement; therefore, the incitement of academic honors is either unnecessary or ineffectual.

58. Logic, as it was cultivated by the schoolmen, proved a fruitless study; therefore, logic as it is cultivated to-day must be a fruitless study.

59. A, B, C, D, and E are the only German students that I know; they are all men of considerable intellectual attainments, and consequently I may infer that all German students are men of considerable intellectual attainments.

60. Repentance is a good quality; wicked men abound in repentance, and therefore abound in what is good.

61. Warm countries alone produce wine. Spain is a warm country, and therefore produces wine.

62. It is an intensely cold climate that is sufficient to freeze mercury; the climate of Siberia is sufficient to freeze it, and hence must be intensely cold.

63. No designing person ought to be trusted; engravers are, by profession, designing persons or designers; therefore, they ought not to be trusted.

64. I will not do this act because it is unjust; I know it is unjust because my conscience tells me so, and my conscience tells me so because the act is wrong.

65. Is a stone a body? Yes. Then is not an animal a body? Yes. Are you an animal? I think so. Ergo, you are a stone, being a body.

66. If ye were Abraham's children ye would do the works of Abraham.—*John* viii, 39.

67. He that is of God heareth God's words; ye there-

fore hear them not, because ye are not of God.—*John* viii, 47.

68. His imbecility of character might have been inferred from his proneness to favorites; for all weak princes have this failing.

69. He is brave who conquers his passions; he who resists temptation conquers his passions; so that he who resists temptation is brave.

70. Suicide is not always to be condemned; for it is but voluntary death, and this has been gladly embraced by many of the greatest heroes of antiquity.

71. All that glitters is not gold; tinsel glitters and therefore is not gold.

72. Meat and drink are the necessaries of life. The revenues of the king were spent on meat and drink, and were therefore spent on the necessaries of life.

73. Nothing but the express-train carries the mail, and as the last train was the express, it must have carried the mail.

74. Theft is a crime; theft was encouraged by the laws of Sparta; therefore, the laws of Sparta encouraged crime.

75. Since all gold is a metal, the most rare of all masses of gold must be the most rare of all the metals.

76. He who calls you a man speaks truly; he who calls you a fool calls you a man; therefore, he who calls you a fool speaks truly.

77. Protective laws should be abolished, for they are injurious if they produce scarcity, and they are useless if they do not.

78. Detention of property implies at least possession; for detention is natural possession.

79. Profit is interpreted or defined to be advantage; to take profit then is to take advantage. It is wrong to take advantage of one's neighbor, and therefore it is wrong to take profit.

80. Peel's remission of taxes was beneficial; the taxes remitted by Peel were indirect, and therefore the remission of indirect taxes is beneficial.

81. Some poisons are vegetable; not poisons are useful drugs, and therefore some useful drugs are not vegetable.

82. Whosoever intentionally kills another should suffer death; a soldier, therefore, who kills his enemy should suffer death.

83. Few towns in the country have 500,000 inhabitants, and since all such towns ought to have three representatives in Congress, it is evident that few towns should have three representatives.

84. If Bacon's opinion be right it is improper to stock a new colony with criminals from prison; but this course we must allow to be proper if the method of colonizing New South Wales be a wise one. If this be wise, therefore, Bacon's opinion is not right.

85. The people of the country are suffering from famine, and as A, B, and C are people of the country, they must be suffering from the famine.

86. You are not what I am; I am a man; therefore, you are not a man.

87. Gold and silver are wealth; and therefore the diminution of the gold and silver of a country by exportation is a diminution of the wealth of the country.

88. The holder of some shares in a lottery is sure to gain a prize, and as I am the holder of some shares in a lottery I am sure to gain a prize.

89. A monopoly of the sugar-refining business is beneficial to sugar refiners; and of the corn trade to corn growers; and of the silk manufacturers to the silk weavers; of labor to the laborers. Now, all these classes of man make up the community. Therefore, a system of restriction upon competition is beneficial to the community.

90. Over-credulous persons should never be believed,

and as the ancient historians were in many instances over-credulous they ought never to be believed.

91. That is unfortunate; you insolently assert that you are a Darwinian, while the truth is that you are a poet.

92. Every incident in the narrative is probable, and hence the narrative may be believed, since it is probable.

93. If a substance is solid it possesses elasticity, and so also it does if it be liquid or gaseous; but all substances are either solid, liquid or gaseous; therefore, all substances possess elasticity.

94. Who is most hungry eats most; who eats least is most hungry; therefore, who eats least eats most.

95. If the elixir of life is of any value those who take it will improve in health; now, my friend who has been taking it has improved in health, and therefore the elixir is of value.

96. What produces intoxication should be prohibited; the use of intoxicating liquors causes intoxication; therefore, the use of spirituous liquors should be prohibited.

97. When we hear that all the righteous people are happy, it is hard to avoid exclaiming, what! are all the unhappy persons we see thought to be unrighteous?

98. Italy is a Catholic country, and abounds in beggars; France is also a Catholic country, and therefore abounds in beggars.

99. If it be fated that you recover from your present disease, you will recover, whether you call in a doctor or not; again, if it be fated that you do not recover from your present disease, you will not recover, whether you call in a doctor or not. But one or the other of these contradictories is fated, and therefore it can be of no service to call in a doctor.

100. All the trees in the park make a thick shade; this oak tree is one of them, and therefore makes a thick shade.

101. All visible bodies shine by their own or by re-

flected light. The moon does not shine by its own; therefore, it shines by reflected light; but the sun shines by its own; therefore, it cannot shine by reflected light.

102. The two propositions, "Aristotle is Living," and "Aristotle is Dead," are both intelligible propositions; they are both of them true or both of them false, because all intelligible propositions must be either true or false.

103. I am charged with absenteeism from my post, and on that ground I am accused of ignorance in regard to the proper duties of my office. But my accuser himself, who was my predecessor in the same office, was not longer than five days in the country of which he was the chief officer.

104. Every law is either useless or it occasions hurt to some person; now, a law that is useless ought to be abolished; and so ought every law that occasions hurt; therefore, every law ought to be abolished.

105. Does a grain of millet when dropped on the floor make a sound? No. Does a bushel of millet make any sound under the same circumstances? Yes. Is there not a determinate proportion between the bushel and the grain? There is. There must, therefore, be the same proportion between the sonorousness of the two. If one grain be not sonorous, neither can ten thousand grains be so.

106. Injustice is more profitable than justice, because those who do unjust acts gain more than the just.

107. Ruminant animals are those who have cloven feet, and they usually have horns; the extinct animal which left this foot-print had a cloven foot; therefore, it was a ruminant animal and had horns. Again, as no beasts of prey are ruminant animals, it cannot have been a beast of prey.

108. Happiness signifies a gratified state of all the faculties. The gratification of faculty is produced by exercise. To be agreeable that exercise must be proportionate to the power of the faculty; if it is insuffi-

cient discontent arises, and its excess produces weariness. Hence, to have complete felicity is to have all the faculties exerted in the ratio of their several developments.

109. I am offered a sum of money to assist this person in gaining the office he desires; to assist a person is to do him good, and no rule of morality forbids the doing of good; therefore, no rule of morality forbids my receiving the sum of money for assisting this person to obtain office.

110. We must either gratify our vicious propensities or resist them; the former course will involve us in sin and misery; the latter requires self-denial. Therefore, we must either fall into sin or practise self-denial.

111. He that can swim needs not despair to fly; for to swim is to fly in a grosser fluid, and to fly is to swim in a subtler fluid.

112. Every moral aim requires the rational means of attaining it; these means are the establishment of laws; and as happiness is the moral aim of man it follows that the attainment of it requires the establishment of laws.

113. The several species of brutes were created to prey upon each other, and consequently the human species was created to prey upon them.

114. If any objection can be urged to justify a change of established laws, no laws could be reasonably maintained; but some laws can be reasonably maintained; therefore, no objection that can be urged will justify a change of established laws.

115. Riches are for spending, and spending for honor and good actions. Therefore, extraordinary expense must be limited by the worth of the occasion.

116. If our rulers could be trusted always to look to the best interests of their subjects, monarchy would be the best form of government. But they cannot be trusted; therefore, monarchy is not the best form of government.

117. The good is pleasure, for it results from the due performance of proper functions; but the good is a state of consciousness; therefore, the good is a state of consciousness which results from the due performance of proper functions.

118. He who bears arms at the command of the magistrate does what is lawful for a Christian; the Swiss in the French service and the British in the American service bore arms at the command of the magistrate; therefore, they did what is lawful for a Christian.

119. No soldiers should be brought into the field who are not well qualified to perform their duty; none but veterans are well qualified to perform their part; therefore, none but veterans should be brought into the field.

120. Improbable events happen almost every day, but what happens almost every day is a very probable event; therefore, improbable events are very probable events.

121. The object of war is durable peace; therefore, soldiers are the best peace-makers.

122. Confidence in promises is essential to human intercourse and commerce; for without it the greatest part of our conduct would proceed upon chance. But there can be no confidence in promises if man were not obliged to perform them; the obligation, therefore, to perform promises is essential to the same ends and in the same degree.

123. The *minimum visibile* is the least magnitude which can be seen; no part of it alone is visible, and yet all the parts of it must affect the mind in order that it may be visible; therefore, every part of it must affect the mind without being visible.

124. He who believes himself to be always in the right in his opinion lays claim to infallibility; you always believe yourself to be in the right in your opinion; therefore, you lay claim to infallibility.

125. If the light is not refracted near the surface of

the moon there cannot be any twilight there ; but if the moon has no atmosphere, light is not refracted near its surface ; therefore, if the moon has no atmosphere it cannot have any twilight.

126. What you say is that virtue is the power of attaining good? Yes. And you would say that goods are such as health and wealth, and the possession of gold and silver, and having office and honor in the state—these are what you call goods? Yes, all these. Then, according to Meno, who is the hereditary friend of the great king, virtue is the power of getting silver and gold.

MISCELLANEOUS

INDUCTIVE AND DEDUCTIVE

127. Geometry contemplates figures. Figure is the termination of magnitude ; but extension in the abstract has no definite determinate magnitude ; whence it follows clearly that it can have no figure, and consequently is not the object of Geometry.

128. The newly discovered painting must be a Rubens ; for the conception, the drawing, the tone and tints are precisely those seen in the authentic works of that master.

129. In nine counties, in which the population is from 100 to 150 per square mile, the births to 100 marriages are 396 ; in sixteen counties, with a population of 150 to 200 per square mile, the births are 390 to 100 marriages. Therefore, the number of births per marriage is inversely related to the density of population, and contradicts Malthus's theory of population.

130. "Cramming" for examination is detrimental rather than otherwise ; for I have noticed that, no matter what the subject is, I invariably write a poor paper when I "cram," and a good one when I do not.

131. If the earth were of equal density throughout it would be about 2½ times as dense as water; but it is about 5½ times as dense; therefore, the earth must be of unequal density.

132. The great famine in Ireland began in 1845, and increased until it reached a climax in 1848. During this time agrarian crime increased very rapidly until, in 1848, it was more than three times as great as in 1845. After this it decreased with the return of better crops, until, in 1851, it was only fifty per cent. more than it was in 1845. It is evident from this that a close relation of cause and effect exists between famine and agrarian crime.

133. "Now that which does not make a man worse, how can it make a man's life worse? But neither through ignorance, nor having the knowledge but not the power to guard against or correct these things, is it possible that the nature of the universe has overlooked them; nor is it possible that it has made so great a mistake, either through want of power or want of skill, that good and evil should happen indiscriminately to the good and the bad. But death certainly, and honor and dishonor, pain and pleasure—all these things happen equally to good men and bad, being things which make us neither nor worse. Therefore, they are neither good nor evil." —*Marcus Aurelius.*

134. If the majority of those who use public houses are prepared to close them legislation is unnecessary; but if they are not prepared for such a measure, then to force it on them by outside pressure is both dangerous and unjust.

135. On May 27, 1875, a remarkable shower of small pieces of hay occurred at Monkstown, near Dublin. They appeared floating down from a great height. A similar shower occurred a few days earlier in Denbighshire. From this and many similar facts we conclude that the distribution of organisms over continents and

islands separated by the ocean has been effected by the agency of natural forces.

136. The influence of heat in changing the level of the ground upon which the Temple of Jupiter Serapis stands might be inferred from several circumstances. In the first place, there are numerous hot springs in the vicinity, and when we reflect on the dates of the principal oscillations of level this conclusion is made much more probable. Thus, before the Christian era, when Vesuvius was regarded as a spent volcano, the ground upon which the temple stood was several feet above water. But after the eruption of Vesuvius in 79 B.C. the temple was sinking. Subsequently, Vesuvius became dormant, and the foundations of the temple began rising. Again Vesuvius became active and has remained so ever since. During this time the temple has been subsiding again, so far as we know its history.

137. This person may reasonably be supposed to have committed the theft, for he can give no satisfactory account of himself on the night of the alleged offence; moreover, he is a person of bad character, and being poor is liable to a temptation to steal.

138. Don't you think the possession of gold is good? Yes, said Ctesippus, and the more the better, and to have money everywhere and always is a good. Certainly, a great good, he said. And you admit that gold is a good? I have admitted that, he replied. And ought not a man have gold everywhere and always, and as much as possible in himself, and may not he be deemed the happiest of men who has three talents of gold in his stomach, and a talent in his head, and a stater of gold in his eye.—*Plato's Dialogues.*

139. It has been found that linnets when shut up and educated with singing larks—the skylark, woodlark, or titlark—will adhere entirely to the songs of these larks instead of the natural song of the linnets. We may infer, therefore, that birds learn to sing by imitation, and

that their songs are no more innate than language is in man.

140. The policy of protection was immediately followed by a great increase in prosperity and wealth of the country, and hence we may infer that the result was due to its connection with the enactment of the protective law. In reply, however, we are told that before the passage of the law the loss by fire in Chicago in one year was $200,000,000, but was only $3,000,000 for the year after its passage, so great was the effect of this act.

141. A man that hath no virtue in himself envieth virtue in others; for men's minds will either feed upon their own good or upon others' evil, and who wanteth the one will prey upon the other.

142. Five years ago a first-class pair of nickel-plated steel skates, with the necessary clamps to fasten them to the boot or shoe, cost $15. To-day, precisely the same article, and with an equal finish and completeness, can be obtained for $4. Three years ago a second grade of nickel-plated steel skates cost $4. The same article can be produced to-day for $1.50. The decline of seventy per cent. in five years, and of sixty per cent. in three years shows just how protection cheapens prices.

143. "'By open discrimination, or by secret rates, drawbacks, and rebates, a few railway managers may subject to their will every business in which transportation is a large element of cost, as absolutely as any oriental despot ever controlled the property of his subjects. No civilized community has ever known any body of rulers with such power to distribute at pleasure, among its mercantile classes, prosperity or adversity, wealth or ruin. That this is no abstract or remote danger to society is plain to any man who will look at the condition of trade and of mercantile morals in the United States to-day.' How vivid! But how absurd! how untrue! Our commercial morals are equal to the highest in the world."

144. We observe very frequently that very poor handwriting characterizes the manuscripts of able men, while the best handwriting is as frequent with those who do little mental work when compared with those whose penmanship is poor. We may infer, therefore, that poor penmanship is caused by the influence of severe mental occupation.

145. Since there is no harm or evil to the elements themselves in their continual changes into one another, a man should have no apprehension about the dissolution of all elements. For it is according to nature, and nothing is evil that is according to nature.—*Marcus Aurelius*.

146. "Mr. Gladstone, however, commits himself to the principle that 'all protection is bad.' If this has been his belief ever since he became an advocate of free trade, his conscience must have received many and severe wounds, as session after session, while Chancellor of the Exchequer, he carried through Parliament a bounty—may I not say a direct protection?—of £180,000 to a line of steamers running between England and the United States--a protection that began six years before free trade was proclaimed, and was continued nearly twenty years after."

"The volumes contain the ripe results of the studies of men who are authorities in their respective fields."—THE NATION.

EPOCHS OF HISTORY

EPOCHS OF ANCIENT HISTORY	EPOCHS OF MODERN HISTORY
Eleven volumes, 16mo, each $1.00.	Eighteen volumes, 16mo, each $1.00.

The Epoch volumes have most successfully borne the test of experience, and are universally acknowledged to be the best series of historical manuals in existence. They are admirably adapted in form and matter to the needs of colleges, schools, reading circles, and private classes. Attention is called to them as giving the utmost satisfaction as class hand-books.

NOAH PORTER, *President of Yale College.*

"The 'Epochs of History' have been prepared with knowledge and artistic skill to meet the wants of a large number of readers. To the young they furnish an outline or compendium. To those who are older they present a convenient sketch of the heads of the knowledge which they have already acquired. The outlines are by no means destitute of spirit, and may be used with great profit for family reading, and in select classes or reading clubs."

CHARLES KENDALL ADAMS, *President of Cornell University.*

"A series of concise and carefully prepared volumes on special eras of history. Each is also complete in itself, and has no especial connection with the other members of the series. The works are all written by authors selected by the editor on account of some especial qualifications for a portrayal of the period they respectively describe. The volumes form an excellent collection, especially adapted to the wants of a general reader."

The Publishers will supply these volumes to teachers at SPECIAL NET RATES, and would solicit correspondence concerning terms for examination and introduction copies.

CHARLES SCRIBNER'S SONS, Publishers

153-157 Fifth Avenue, New York.

THE GREAT SUCCESS OF THE SERIES

is the best proof of its general popularity, and the excellence of the various volumes is further attested by their having been adopted as text-books in many of our leading educational institutions. The publishers beg to call attention to the following list comprising some of the most prominent institutions using volumes of the series:

Smith College, Northampton, Mass.
Univ. of Vermont, Burlington, Vt.
Yale Univ., New Haven, Conn.
Harvard Univ., Cambridge, Mass.
Bellewood Sem., Anchorage, Ky.
Vanderbilt Univ., Nashville, Tenn.
State Univ., Minneapolis, Minn.
Christian Coll., Columbia, Mo.
Adelphi Acad., Brooklyn, N. Y.
Earlham Coll., Richmond, Ind.
Granger Place School, Canandaigua, N. Y.
Salt Lake Acad., Salt Lake City, Utah.
Beloit Col., Beloit, Wis.
Logan Female Coll., Russellville, Ky.
No. West Univ., Evanston, Ill.
State Normal School, Baltimore, Md.
Hamilton Coll., Clinton, N. Y.
Doane Coll., Crete, Neb.
Princeton College, Princeton, N. J.
Williams Coll., Williamstown, Mass.
Cornell Univ., Ithaca, N. Y.
Illinois Coll., Jacksonville, Ill.
Univ. of South, Sewaunee, Tenn.
Wesleyan Univ., Mt. Pleasant, Ia.
Univ. of Cal., Berkeley, Cal.
So. Car. Coll., Columbia, S. C.
Amsterdam Acad., Amsterdam, N. Y.
Carleton Coll., Northfield, Minn.
Wesleyan Univ., Middletown, Mass.
Albion Coll., Albion, Mich.
Dartmouth Coll., Hanover, N. H.
Wilmington Coll., Wilmington, O.
Madison Univ., Hamilton, N. Y.
Syracuse Univ., Syracuse, N. Y.
Univ. of Wis., Madison, Wis.
Union Coll., Schenectady, N. Y.
Norwich Free Acad., Norwich, Conn.
Greenwich Acad., Greenwich, Conn.
Univ. of Neb., Lincoln, Neb.
Kalamazoo Coll., Kalamazoo, Mich.
Olivet Coll., Olivet, Mich.
Amherst Coll., Amherst, Mass.
Ohio State Univ., Columbus, O.
Free Schools, Oswego, N. Y.

Bishop J. F. HURST, *ex-President of Drew Theol. Sem.*

"It appears to me that the idea of Morris in his Epochs is strictly in harmony with the philosophy of history—namely, that great movements should be treated not according to narrow geographical and national limits and distinction, but universally, according to their place in the general life of the world. The historical Maps and the copious Indices are welcome additions to the volumes."

EPOCHS OF MODERN HISTORY.

A SERIES OF BOOKS NARRATING THE HISTORY OF ENGLAND AND EUROPE AT SUCCESSIVE EPOCHS SUBSEQUENT TO THE CHRISTIAN ERA.

Edited by

EDWARD E. MORRIS.

Eighteen volumes, 16mo, with 74 Maps, Plans, and Tables. Sold separately. Price per vol., $1.00. The Set, Roxburgh style, gilt top, in box, $18.00.

THE BEGINNING OF THE MIDDLE AGES—England and Europe in the Ninth Century.

By the Very Rev. R. W. CHURCH, M.A.

"A remarkably thoughtful and satisfactory discussion of the causes and results of the vast changes which came upon Europe during the period discussed. The book is adapted to be exceedingly serviceable."—*Chicago Standard.*

"At once readable and valuable. It is comprehensive and yet gives the details of a period most interesting to the student of history."—*Herald and Presbyter.*

"It is written with a clearness and vividness of statement which make it the pleasantest reading. It represents a great deal of patient research, and is careful and scholarly."—*Boston Journal.*

THE NORMANS IN EUROPE—The Feudal System and England under the Norman Kings.

By Rev. A. H. JOHNSON, M.A.

"Its pictures of the Normans in their home, of the Scandinavian exodus, the conquest of England, and Norman administration, are full of vigor and cannot fail of holding the reader's attention."—*Episcopal Register.*

"The style of the author is vigorous and animated, and he has given a valuable sketch of the origin and progress of the great Northern movement that has shaped the history of modern Europe."—*Boston Transcript.*

THE CRUSADES. By Rev. G. W. Cox.

"To be warmly commended for important qualities. The author shows conscientious fidelity to the materials, and such skill in the use of them, that, as a result, the reader has before him a narrative related in a style that makes it truly fascinating."—*Congregationalist.*

"It is written in a pure and flowing style, and its arrangement and treatment of subject are exceptional."—*Christian Intelligencer.*

THE EARLY PLANTAGENETS—Their Relation to the History of Europe; The Foundation and Growth of Constitutional Government. By Rev. W. STUBBS, M.A.

"Nothing could be desired more clear, succinct, and well arranged. All parts of the book are well done. It may be pronounced the best existing brief history of the constitution for this, its most important period."—*The Nation.*

"Prof. Stubbs has presented leading events with such fairness and wisdom as are seldom found. He is remarkably clear and satisfactory."—*The Churchman.*

EDWARD III. By Rev. W. WARBURTON, M.A.

"The author has done his work well, and we commend it as containing in small space all essential matter."—*New York Independent.*

"Events and movements are admirably condensed by the author, and presented in such attractive form as to entertain as well as instruct."—*Chicago Interior.*

THE HOUSES OF LANCASTER AND YORK —The Conquest and Loss of France. By JAMES GAIRDNER.

"Prepared in a most careful and thorough manner, and ought to be read by every student."—*New York Times.*

"It leaves nothing to be desired as regards compactness, accuracy, and excellence of literary execution."—*Boston Journal.*

THE ERA OF THE PROTESTANT REVOLUTION. By FREDERIC SEEBOHM. With Notes, on Books in English relating to the Reformation, by Prof. GEORGE P. FISHER, D.D.

"For an impartial record of the civil and ecclesiastical changes about four hundred years ago, we cannot commend a better manual."—*Sunday-School Times.*

"All that could be desired, as well in execution as in plan. The narrative is animated, and the selection and grouping of events skillful and effective."—*The Nation.*

THE EARLY TUDORS—Henry VII., Henry VIII. By Rev. C. E. MOBERLEY, M.A., late Master in Rugby School.

"Is concise, scholarly, and accurate. On the epoch of which it treats, we know of no work which equals it."—*N. Y. Observer.*

"A marvel of clear and succinct brevity and good historical judgment. There is hardly a better book of its kind to be named."—*New York Independent.*

THE AGE OF ELIZABETH. By Rev. M. CREIGHTON, M.A.

"Clear and compact in style; careful in their facts, and just in interpretation of them. It sheds much light on the progress of the Reformation and the origin of the Popish reaction during Queen Elizabeth's reign; also, the relation of Jesuitism to the latter."—*Presbyterian Review.*

"A clear, concise, and just story of an era crowded with events of interest and importance."—*New York World.*

THE THIRTY YEARS' WAR—1618-1648. By SAMUEL RAWSON GARDINER.

"As a manual it will prove of the greatest practical value, while to the general reader it will afford a clear and interesting account of events. We know of no more spirited and attractive recital of the great era."—*Boston Saturday Evening Gazette.*

"The thrilling story of those times has never been told so vividly or succinctly as in this volume."—*Episcopal Register.*

THE PURITAN REVOLUTION; and the First Two Stuarts, 1603-1660. By SAMUEL RAWSON GARDINER.

"The narrative is condensed and brief, yet sufficiently comprehensive to give an adequate view of the events related."—*Chicago Standard.*

"Mr. Gardiner uses his researches in an admirably clear and fair way"—*Congregationalist.*

"The sketch is concise, but clear and perfectly intelligible."—*Hartford Courant.*

THE ENGLISH RESTORATION AND LOUIS XIV., from the Peace of Westphalia to the Peace of Nimwegen. By OSMUND AIRY, M.A.

"It is crisply and admirably written. An immense amount of information is conveyed and with great clearness, the arrangement of the subjects showing great skill and a thorough command of the complicated theme."—*Boston Saturday Evening Gazette.*

"The author writes with fairness and discrimination, and has given a clear and intelligible presentation of the time."—*New York Evangelist.*

THE FALL OF THE STUARTS; and Western Europe. By Rev. EDWARD HALE, M.A.

"A valuable compend to the general reader and scholar."—*Providence Journal.*

"It will be found of great value. It is a very graphic account of the history of Europe during the 17th century, and is admirably adapted for the use of students."—*Boston Saturday Evening Gazette.*

"An admirable handbook for the student."—*The Churchman.*

THE AGE OF ANNE. By EDWARD E. MORRIS, M.A.

"The author's arrangement of the material is remarkably clear, his selection and adjustment of the facts judicious, his historical judgment fair and candid, while the style wins by its simple elegance."—*Chicago Standard.*

"An excellent compendium of the history of an important period."—*The Watchman.*

THE EARLY HANOVERIANS—Europe from the Peace of Utrecht to the Peace of Aix-la-Chapelle. By EDWARD E. MORRIS, M.A.

"Masterly, condensed, and vigorous, this is one of the books which it is a delight to read at odd moments; which are broad and suggestive, and at the same time condensed in treatment."—*Christian Advocate.*

"A remarkably clear and readable summary of the salient points of interest. The maps and tables, no less than the author's style and treatment of the subject, entitle the volume to the highest claims of recognition."—*Boston Daily Advertiser.*

FREDERICK THE GREAT, AND THE SEVEN YEARS' WAR. By F. W. LONGMAN.

"The subject is most important, and the author has treated it in a way which is both scholarly and entertaining."—*The Churchman.*

"Admirably adapted to interest school boys, and older heads will find it pleasant reading."—*New York Tribune.*

THE FRENCH REVOLUTION, AND FIRST EMPIRE. By WILLIAM O'CONNOR MORRIS. With Appendix by ANDREW D. WHITE, LL.D., ex-President of Cornell University.

"We have long needed a simple compendium of this period, and we have here one which is brief enough to be easily run through with, and yet particular enough to make entertaining reading."—*New York Evening Post.*

"The author has well accomplished his difficult task of sketching in miniature the grand and crowded drama of the French Revolution and the Napoleonic Empire, showing himself to be no servile compiler, but capable of judicious and independent criticism."—*Springfield Republican.*

THE EPOCH OF REFORM—1830-1850. By JUSTIN MCCARTHY.

"Mr. McCarthy knows the period of which he writes thoroughly, and the result is a narrative that is at once entertaining and trustworthy."—*New York Examiner.*

"The narrative is clear and comprehensive, and told with abundant knowledge and grasp of the subject."—*Boston Courier.*

IMPORTANT HISTORICAL WORKS.

CIVILIZATION DURING THE MIDDLE AGES. Especially in its Relation to Modern Civilization.

By GEORGE B. ADAMS, Professor of History in Yale University. 8vo, $2.50.

Professor Adams has here supplied the need of a text-book for the study of Mediæval History in college classes at once thorough and yet capable of being handled in the time usually allowed to it. He has aimed to treat the subject in a manner which its place in the college curriculum demands, by presenting as clear a view as possible of the underlying and organic growth of our civilization, how its foundations were laid and its chief elements introduced.

Prof. KENDRIC C. BABCOCK, University of Minnesota:—"It is one of the best books of the kind which I have seen. We shall use it the coming term."

Prof. MARSHALL S. BROWN, Michigan University:—"I regard the work as a very valuable treatment of the great movements of history during the Middle Ages, and as one destined to be extremely helpful to young students."

BOSTON HERALD:—"Professor Adams admirably presents the leading features of a thousand years of social, political, and religious development in the history of the world. It is valuable from beginning to end."

HISTORY OF THE UNITED STATES.

By E. BENJAMIN ANDREWS, D.D., LL.D., President of Brown University. With maps. Two vols., crown octavo, $4.00.

BOSTON ADVERTISER:—"We doubt if there has been so complete, graphic, and so thoroughly impartial a history of our country condensed into the same space. It must become a standard."

ADVANCE:—"One of the best popular, general histories of America, if not the best."

HERALD AND PRESBYTER:—"The very history that many people have been looking for. It does not consist simply of minute statements, but treats of causes and effects with philosophical grasp and thoughtfulness. It is the work of a scholar and thinker."

DATE DUE

United Theological Seminary Library
MAIN BC101.H8 1899
Hyslop, James Logic and argument /
3 0645 0004 7937 4